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ABSTRACT

Madagascar is a poor, primarily rural country in which three-quarters of the population has subsisted below the poverty line for at least two decades. In view of the important role of education in the government's poverty reduction agenda, this report documents the current status of educational development in Madagascar and the key constraints on the performance of the educational sector. Chapters examine: (1) demography and macroeconomic context; (2) access to and coverage of the education system; (3) education finance (national spending, patterns of public spending per student); (4) disparities and inequities in enrollments, patterns of student flow, and public spending; (5) primary and secondary education (supply and demand, teacher recruitment and allocation, small schools and economies of scale, learning outcomes, decentralization); (6) vocational and technical education and training; (7) higher education; and (8) education and the labor market. Major challenges include high elementary dropout and grade repetition rates; deteriorating levels of labor force skills; mismatch between education and available jobs; great inequities in education spending across income groups, education levels, and provinces; patterns of teacher allocation that disadvantage rural schools and certain provinces; inefficiencies related to poorly managed small schools with overspecialized teachers; and the lack of an accountability system. (Contains 82 references and many data tables.) (SV)

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A WORLD BANK COUNTRY STUDY

THE WORLD BANK

Education and Training in Madagascar

Toward a Policy Agenda for Economic Growth and Poverty Reduction

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The World Bank
Washington, D.C.

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Foreword

World Bank support for educational development in Madagascar dates back to at least 1989, when the first Bank-financed education project was approved. Two more education projects (one of them still under implementation) followed, providing continuity in the Bank's engagement in policy development and implementation in the sector. In addition to project financing, World Bank assistance also takes the form of analytical activities and advice. This report is an example of such assistance. As with project financing, the ultimate objectives are to help the country expand its educational opportunities, particularly at the lower levels of the system, and to improve quality throughout the system. Unlike in project financing, however, the focus is on diagnosing major constraints on educational development so as to help identify appropriate policy responses to those constraints, rather than on setting forth detailed specifications for project inputs and their design, implementation plans, and so on.

Such analytical work and advice are becoming increasingly relevant in the context of debt relief under the Heavily Indebted Poor Countries (HIPC) Initiative and the related preparation of Poverty Reduction Strategy Papers (PRSPs). These developments reflect a growing recognition among donors, including the World Bank, that although external financing through projects is important for sector development, the aggregate flow of resources, both external and domestic, has to be linked more closely to the achievement of tangible results, particularly as they relate to poverty and the quality of life enjoyed by the population. There is also agreement that because poverty reduction strategies cannot succeed without country ownership, it is appropriate for each country to take responsibility for preparing its own PRSP, relying on a process of participatory consultation with civil society to develop a shared vision on the way forward.

These two features in the new dynamic of development aid motivate the need to deepen our understanding of the current status of educational development and the obstacles that stand in the way of progress, both to provide a factual basis for policy dialogue and to identify specific outcomes as goals around which to build mutual accountabilities for the use of national and donor resources. This report is an attempt by the World Bank to respond to that need. Although it does not take up the full range of issues in the sector, its focus on cost and financing addresses some of the key concerns of policymakers and others engaged in the HIPC/PRSP process.

I am particularly pleased to note that the preparation of the report has involved substantial and close collaboration between the World Bank team and its Malagasy counterparts. At the outset, a national team made up of representatives from the three education ministries and from other government agencies was constituted. Interaction between this team and the Bank team was maintained through all stages of the work, from defining its scope to data collection and analysis, report writing and dissemination, and policy dialogue. As the long list of names

in the Acknowledgments section attests, others also participated in various ways—in particular, representatives from the donor community, nongovernmental organizations, and members of civil society. The extensive collaboration was critical in preparing the report and is essential for strengthening country ownership of the analytical results and of their implications for policy development.

Wide dissemination and discussion of the diagnostic results are first steps in the process of policy development. It is my sincere hope that the publication of this summary of the main findings in an easily accessible format will make a small but nonetheless tangible contribution to Madagascar's efforts to shape an effective response to the challenge of poverty reduction.

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Abstract

The prospects for educational development are excellent in Madagascar today in light of the increasingly favorable policy environment for the sector. During the first half of the 1990s, public spending on education relative to the gross domestic product (GDP) declined more than 40 percent, coinciding with a five-fold rise in the country's interest payment on external debt. As the debt service burden began to ease after 1995, public spending on education began to recover, reaching the same level of spending in 2000 as at the start of the 1990s, around 3.0 percent of GDP. As the governments' efforts to reduce poverty is put into place, the sector's claim on public spending can be expected to grow, a prospect made possible in part by earmarking a significant share of the resources freed up by debt relief for investments in education. A key challenge for policy makers and managers in the sector is to transform public spending in the sector into educational outcomes that would make a significant contribution to poverty reduction. The analysis in this report identifies challenges at all levels in the formal system. An important goal in the medium term is to universalize access to basic education of reasonable quality while closely linking expansion of other levels and types of education and training to labor market demand. In primary education the challenges include: (a) raising the survival rates to the end of the primary cycle and reducing grade repetition; (b) rationalizing teacher allocation across schools and enhancing time use of teachers; and (c) improving student learning through adequate provision of learning materials, but especially by strengthening management of the pedagogical process. At the secondary level, the policy issues that warrant attention include: (a) expanding enrollments at a moderate pace in the lower secondary cycle, while focusing more on quality improvements than on expansion in the upper secondary cycle; and (b) taking advantage of scale economies and increasing the practice of multi-subject teaching to manage the high cost of service delivery. In the field of vocational and technical education and training, the main issue is to rationalize the supply of training services so as to reduce their costs and align them more closely to labor market demand. Finally, in higher education, the government faces two immediate issues: (a) rationalizing the system's structure in order to improve quality and responsiveness to the demand for skills in the labor market; and (b) improving personnel management, particularly that relating to compensation for over-time teaching and the use of administrative staff.

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Abbreviations and Acronyms

AGENATE	Agence Nationale d'Evaluation
ARIF	Association Régionale Inter-Professionnelle pour le Développement de la Formation Professionnelle
BEPC	*Brevet d'enseignement du premier cycle*
CEPE	*Certificat d'études primaires élémentaires*
CERES	Centre de Ressources des Personnels des Etablissements d'Enseignement Technique et Professionnel
CFP	*Centre de formation professionnelle*
CISCO	Circonscription Scolaire (school district)
CNFTP	Conseil National de la Formation Technique et Professionnelle
CNTEMAD	Centre National de Télé-Enseignement de Madagascar
CONFEMEN	Conférence des Ministres de l'Education des Pays ayant le Français en Partage
DEA	*Diplôme d'études approfondies*
DETFP	Direction de l'Enseignement Technique et de la Formation Professionnelle
DEUG	*Diplôme d'enseignement universitaire général*
DGGETFP	Délégation Générale du Gouvernement à l'Enseignement Technique et à la Formation Professionnelle
DIRESEB	Direction de l'Enseignement Secondaire et de l'Education de Base
ENI	Ecole Nationale d'Informatique
ENS	*Ecole normale supérieure*
ENSET	Ecole Normale Supérieure pour l'Enseignement Technique
ESP	*Ecole supérieure polytechnique*
ESSA	Ecole Supérieure des Sciences Agronomiques
FIFP	Fonds d'Intervention à la Formation Professionnelle
FRAM	Fikambanan'ny Ray-Amandrenin'ny Mpianatra (school-based parent-teacher association)
GIREFTPs	Groupements Inter-Régionaux d'Etablissements de Formation Technique et Professionnelle
HIPC Initiative	Heavily Indebted Poor Countries Initiative
IHSM	Institut Halieutique des Sciences Marines
INSTAT	Institut National de la Statistique
IOSTM	Institut d'Odontologie-Stomatologie Tropicale de Madagascar

IST	*Institut supérieur de technologie*
LTP	*Lycée technique professionnel*
MBDPA	Ministère chargé du Budget et du Développement des Provinces Autonomes
METFP	Ministère de l'Enseignement Technique et Formation Professionnelle
MINESEB	Ministère de l'Enseignement Secondaire et de l'Education de Base
MINESUP	Ministère de l'Enseignement Supérieur
ONCE	Observatoire National des Compétences pour l'Emploi
ONETFOPP	Office National de l'Enseignement Technique et de la Formation Professionnelle Privée
PASEC	Programme d'Analyse des Systèmes Educatifs de la CONFEMEN
PAT	*Personnel administrif et technique*
PDES	Plan Directeur de l'Enseignement Supérieur
PDI	Plan de Développement Institutionnel
PNAE	Programme National pour l'Amélioration de l'Education
PRAGAP	Programme de Renforcement et d'Amélioration de la Gestion Administrative et Pédagogique
TEFISO	Teknica Fiofanana Sosialista
VSNs	*Volontaires du service national*

Exchange rate (June 21, 2001): 1 Malagasy franc (FMG) = US$0.00015. 1 U.S. dollar = 6.657 FMG.

Executive Summary

Madagascar is a poor country; nearly three-quarters of its population has subsisted below the poverty line for at least the past two decades. Yet it is endowed with abundant and unique natural resources that can be mobilized to raise the standard of living of its people. Several recent developments have made the country's prospects for reducing poverty and improving the well-being of its population more promising.

Most important, the government has renewed its commitment to poverty reduction by articulating a publicly discussed strategy containing explicit goals for macroeconomic management and sectoral development in key areas. Signs of economic recovery are emerging. Gross domestic product (GDP) grew an average 4.1 a year during 1997–99 (as against only 1.9 percent a year during 1995–96) and is projected to accelerate to 8 percent or more in the coming years. The country's burden of external debt is being lightened under the World Bank–International Monetary Fund Heavily Indebted Poor Countries (HIPC) Initiative, with projected savings in debt service payment on the order of US$50 million annually for at least the next 10 years.

Government spending on education has been rising over the past five years, and the increase can be expected to continue, in part because a large share of the savings from the HIPC Initiative is earmarked for the education sector. Expectations that education will make a significant contribution to the government's poverty reduction agenda are high. For policymakers and managers in the sector, the central issue is to advance that agenda through good stewardship of the available resources. This report seeks to inform the discussion by documenting the current status of educational development in Madagascar and the key constraints on the performance of the sector.

Scope of the Report and Its Audience

The report deals with the main education sectors—primary, secondary, vocational/technical, and higher education—but its focus is necessarily limited by the complexity of the subject. In particular, nonformal education has been set aside for elaboration by others, even though it is an important element in any poverty reduction strategy. Similarly, neither early childhood education nor such traditional educational issues as curriculum development, teacher education, and pedagogical methods are addressed in this report. Rather, the emphasis is on key aspects of education cost and finance and the link between spending choices and educational outcomes.

The report is primarily intended for education and other policymakers in Madagascar. Given the subject matter and the context, it should also be of interest to the multilateral and bilateral donor community, to nongovernmental organizations that are active in education, and to teachers, students, parents, and other members of the general public who are directly or indirectly concerned about the broader policy context of their involvement in education.

A key objective of the report is to contribute toward developing a widely shared vision for educational development in Madagascar based on a common understanding of the challenges involved and the role that each participant can play in realizing that vision. Open discussion of the report is an important part of the process for creating a common understanding.

Such a process is, of course, only the first step toward policy development. Given its diagnostic focus and its selective scope, this report offers no policy prescriptions. Rather, it provides background that can assist in the design of policies. Ideally, policy development should be carried out with the participation of all the actors involved.

The Economic Development Context

Madagascar is a predominantly agricultural country; about 75 percent of the labor force is engaged in farming and other rural pursuits. In all, 85 percent of workers are in the informal sector. Accelerated economic growth is a necessary, but obviously not sufficient, condition for overcoming the country's deep-seated poverty. Given the current structure of the economy, achievement of such growth in the coming decades will depend on two parallel developments: increased productivity in agriculture and the informal economy (which will continue to employ the bulk of the labor force), and expansion of the modern, and typically more productive, sector. Investments in education can help facilitate both developments, but the kinds of interventions needed are likely to differ according to the sector of the education system.

Worldwide historical experience suggests that no country has managed to develop its economy without putting in place a system of mass basic education capable of producing a literate and numerate population that can contribute to overall economic modernization. That experience also suggests that above the basic level of education, the production of educated labor needs to be linked closely to the pace of job creation in the modern sector. Thus, while at the primary level the goal is clearly to ensure that all children benefit from at least five years of primary schooling, the development of other levels in the system, especially higher education, must be calibrated, in qualitative as well as quantitative terms, to the labor market's capacity to absorb educated labor.

Acceptance of this broad understanding of the direction for educational development provides a benchmark for assessing the various layers of management decisions needed to optimize the performance of the education system as a whole. Initial conditions are important in this regard, for they delineate the system's current strengths and weaknesses, as well as the tradeoffs and policy challenges that must be managed to produce the best results within the inevitable budget constraints. Cross-country experience also imparts a useful perspective by illustrating the scope of potentially viable choices and by bringing into focus the distance that Madagascar must travel to match other countries' achievements in education. In an increasingly globalized world in which the basic skills and the technical know-how and competencies of the whole population make the difference between competitive and lagging economies, the education sector cannot afford to fall behind.

Strengths of Madagascar's Education System

Madagascar starts out with some important assets in education. The country was one of the earliest to recognize the importance of mass basic education, and over the years the government has extended the network of public primary schools to almost all of the country's some 11,000 neighborhoods, or *fokotanys*. The social demand for education appears to be generally strong, as indicated by the high entry rates to first grade (averaging 81 percent for the country and 75 percent or more in all provinces except Toliara); the large private sector presence at all levels of education; and the substantial spending by households throughout the system, which in 1997 made up an estimated 35 percent of the country's national investment in education.

Unlike the situation in many low-income countries, girls in Madagascar are as likely to enroll as boys; the gender gap widens (and then, not dramatically) only in certain fields of technical education and in higher education. Student learning in primary education compares favorably with outcomes in other low-income countries, with Mala-

gasy children scoring above the sample averages in language, mathematics, and life skills.

Policy development has already led to some major achievements. In particular, in the decade just past, Madagascar successfully managed the difficult and often politically tense tradeoffs in resource allocation between higher education and the lower levels—tradeoffs that many low-income countries continue to confront today. Higher education now absorbs 13 percent of total public spending on education, instead of the 30 percent or so that prevailed in the early 1990s. Furthermore, there is growing recognition of the need for greater local participation in school management, and institutional mechanisms have been put in place to formalize decentralization in education.

Perhaps the greatest asset of the system is its potential for continued growth, given the highly favorable prospects for increased public investment in education. In such a context, the political economy of policy reform will be easier to manage, in that some of the transitional costs of reforming the system's operational arrangements can be absorbed through strategic allocation of the incremental spending. An important factor is that overall levels of teacher salaries in primary and secondary education do not appear out of line with market conditions and therefore do not present a major problem, beyond the need for appropriate incentives to motivate improvements in service delivery.

Challenges for the Next Decade

Policymakers in Madagascar face an exciting situation in which the choices they make today can truly help propel the system toward an efficient and equitable path of expansion. This section reviews the main problems and challenges to be taken into account in developing education policies.

Managing output from the education system

Incomplete primary education. A major problem of the education system is that many children leave school without a complete primary education, which is generally regarded as the minimum investment necessary for achieving permanent literacy and numeracy. Although entry rates to grade 1 are high, only about a third of the entrants successfully complete the full five-year primary cycle. Furthermore, repetition rates are uniformly high throughout the primary cycle, averaging about 31 percent in 1998. These patterns have remained unchanged for most of the past decade, and they make Madagascar's system one of the least efficient in terms of student flow.

Deteriorating skills levels. The latest data from household surveys show a decline in the share of the labor force of those with no schooling and a rise in the share of those with secondary schooling. The improvement, however, is largely illusory, since the same data also indicate that younger workers have far fewer years of schooling than their elders (4.2 years, on average, among those age 20–24, for example, compared with 5.2 years among those age 35–39). The clear deterioration in the educational attainment of the labor force raises questions about the system's ability to meet the skills needs of a modernizing rural economy.

Mismatch between jobs and education. At postprimary levels, the student flow indicators are better, although there is still room for improvement. The most important issue here concerns the output of graduates and their absorption into the labor market. In the aggregate, the volume of postprimary graduates seems consistent with the demand for labor. At the top end of the educational ladder, however, there is evidence of substantial overproduction: jobs for highly educated labor are currently expanding at perhaps 2,000 to 2,500 positions a year, but the system is producing about 3,700 higher education graduates annually. One consequence of this overproduction, which has been sustained over many years, is that graduates find themselves in jobs for which they are overqualified, and the adverse effects percolate down to school leavers with less education. Had enrollments in higher education not been brought under control during the 1990s, the problem would have been much worse.

The foregoing picture suggests that a major effort is needed to boost the performance of the primary school system. At the same time, as cohort survival rates improve, selection mechanisms need to be put in place to ensure that enrollments at postbasic

levels expand at a rate commensurate with the capacity of the labor market to absorb graduates into productive employment. The recent creation of the distance learning system in higher education, and the decision to admit private suppliers to the sector, are important mechanisms for managing the excess demand for education at this level.

Improving equity in education

Income and education spending. Madagascar has one of the most inequitable patterns of public spending on education among low-income countries. In 1997 the bottom 20 percent of the population received only 7 percent of government spending on education, while the top 20 percent received 36 percent, implying that the rich received more than five times as much as the poor. Across members of each birth cohort, the best educated receive an estimated 63 percent of the spending on the entire cohort.

Equity across education levels. Making the pattern of spending more equitable will require a restructuring of public spending per student in favor of primary education, as well as substantial progress in ensuring that children persist to the end of the primary cycle. Public spending per student in higher education is currently 1.57 times per capita gross national product (GNP), compared with about 0.83 for low- and middle-income countries in Latin America, Asia, and the Middle East. Simulations suggest that reducing spending on higher education by about half while, at the same time, raising the cohort survival rate in primary education from 33 percent to about 50 percent would bring Madagascar's system closer to the more equitable patterns found in countries of those other developing regions.

Provincial differences. Across provinces and income groups, there are substantial gaps both in the rate of entry to grade 1 and in survival patterns to the end of the cycle. More needs to be done, particularly in Toliara but also in Fianarantsoa and Mahajanga, to raise entry rates. Survival rates are poor in all provinces, but the need to improve is especially pressing in Fianarantsoa and Toliara, where barely a fifth of first-graders currently complete their primary schooling. A combination of demand- and supply-side interventions will be needed to ameliorate the situation.

Policy options. As in most other settings, poverty and parental income play an important role on the demand side, but these factors are not directly within reach of the policy instruments currently available to policymakers. Interventions on the supply side can have a direct impact and can also work indirectly on demand by improving schools and making school attendance more attractive. Supply-side measures might include, for example, adjusting the school calendar to reduce the opportunity cost of schooling and providing school feeding as a form of income transfer to poor families. According to our estimates, ensuring that children have access to a complete cycle of instruction and reducing repetition rates to about half their current levels would, together, boost survival rates from 33 percent at present to more than 58 percent.

Managing public spending on education

Primary education a priority. Bringing about improvements in outcomes requires good stewardship of public spending on education. At the aggregate level, current spending on education is modest, at 3.1 percent of GDP, compared with 4 percent in most other low-income countries. A priority in overall public finance is to seek ways to increase the public resources available for education. Beyond the aggregate increase, it is also important to ensure that resources are channeled to primary schooling. During the past decade, as total spending on education was squeezed under the weight of growing external debt, the government, to its credit, managed to redirect the shrinking resources for education toward basic education. The main beneficiary, however, turned out to be secondary rather than primary education. In the coming years it will be important to ensure that increases in spending do in fact reach all the way down to the primary level.

Shifting spending patterns toward teaching. A closer examination of the pattern of aggregate spending suggests that more could be done to improve the distribution of public spending across

functions. Ideally, a substantial share of spending would go to support the core activities of teaching and learning—the main business of education, after all. Especially at postprimary levels of schooling, too large a share appears to be allocated to administrative and support services at the individual school level. In lower and upper secondary schools, for example, only about half the government's total spending goes for the core business of classroom teaching, while school administration and support services at the school level absorb about 20 percent of spending. In vocational/technical education and higher education the share of teaching services drops to 34 and 29 percent, respectively, while the share of administration rises to 22 and 28 percent. Furthermore, within higher education the current system of remuneration for overtime teaching results in nearly 80 percent of teaching being paid on overtime. There also appears to be scope for rationalizing the current arrangements for student finance. Overall, although the benchmarks for identifying an ideal allocation of spending are lacking, current spending appears to be insufficiently focused on the system's core business and strategic goals. Closer examination, either to justify the pattern or to reform it, would be beneficial.

Improving teacher allocation across schools

Beyond the systemwide problems in resource allocation, there is also room for improving the allocation of spending among schools. Because teachers represent the bulk of the public spending that schools receive, their deployment across schools provides a good picture of the current patterns of allocation of spending in the system. The results suggest that there is substantial inconsistency in the allocation: primary schools with about 100 pupils, for example, may have as many as 7 teachers, but some of these schools receive no allocation at all and must rely on teachers who are financed entirely through parental contributions to the school's parent-teacher association. On average, Antsiranana and Toamasina appear to receive fewer primary school teachers than other provinces. The differences across provinces, however, pale in comparison with the inconsistency in allocation among schools within a province. In secondary education the pattern of inconsistency persists, although to a lesser extent. At all levels, the allocation favors Antananarivo Province (and especially the city of Antananarivo) and urban areas in general.

Redeployment. The government did take steps to improve the situation through two rounds of redeployment that involved nearly 5,000 primary school teachers and 1,000 secondary school teachers. It is unclear, however, to what extent the inconsistency in staffing across schools was in fact rectified. For example, in Antananarivo many schools have more teachers than would be consistent with systemwide norms based on enrollments, and only 104 teachers in that province were deployed in the two exercises.

Recruitment. Since 1997–98, there have been two rounds of teacher recruitment. The placement of the new recruits has tended to favor understaffed schools: the probability that such schools received a new teacher is estimated to be 13.5 percent (rising to 35.4 percent among those short by 3 teachers or more), compared with 8.9 percent for a school that was adequately staffed. In future rounds of teacher recruitment, it will be important to strengthen the focus on understaffed schools, particularly those in rural areas. Given the current pattern of staffing, any new teacher allocation to schools in the city of Antananarivo would need careful and convincing justification. There are plans, too, to enhance the incentives for rural posting. The design of these measures warrants thorough assessment to ensure that they are effective both in attracting teachers to rural schools and in retaining them, by offering sufficient inducements to compensate for the disadvantages of working in remote areas.

Taking advantage of scale economies and managing unit costs in small schools

Madagascar's sparse population and the government's policy of ensuring that, at least at the primary level, schools are physically close to the population they serve combine to produce a significant number of small schools. Indeed, more than 30 percent of the public primary schools enroll no more than 75 pupils each, far below the minimum economic size of about 250 pupils. In lower and upper

secondary education, economies of scale are even larger, but small schools continue to be a prominent feature in the system. In vocational/technical education and in higher education the small size of the systems and fragmentation across multiple locations combine to make it difficult to realize economies of scale in service delivery. In the *centres de formation professionnelle* (CFPs), for example, more than half the unit cost of service delivery is accounted for by fixed costs; the high share reflects the effect of the small enrollments in many schools. At these levels the problems are compounded by the duplication of course offerings across institutions. Thus, the entire system is both costly and inadequately diversified.

Potential for school consolidation. The results have two implications for cost management. The first is that the spatial distribution of institutions at all levels has to be examined carefully to ensure that feasible options for school consolidation are not ignored. School consolidation can entail combining nearby schools that offer the same level of instruction or contiguous cycles. (Many of Madagascar's private schools, too, are small, but they invariably take advantage of economies of scope by combining under one roof different levels of schooling—for example, primary and secondary, or lower and upper secondary—whereas most public schools offer only a single cycle of instruction.) Any plan for consolidation will inevitably increase the cost of schooling for some students, who may have to travel farther or even board away from home. All such plans would therefore need to be combined with arrangements for student finance to ensure that deserving students from poor families are not adversely affected. Doing so will call for a more strategic use of the resources currently allocated to student subsidies at all levels in the system.

Multigrade instruction. The second set of implications pertains to cost management measures in small schools. Multigrade teaching will be important at the primary level, and apparently a large number of schools in Madagascar already practice it. Its use should, in theory, not affect children's access to full-day instruction, but the way it is implemented in Madagascar leaves large numbers of children in the public schools with less than 3 hours of instruction a day. In public schools enrolling fewer than 50 pupils, for example, only one-third of the children receive full-day instruction, compared with more than two-thirds among private schools of similar size.

Teacher specialization. At the secondary level, cost management in small schools would require a closer look into teachers' workloads and subject specialization. At both the lower and upper secondary levels, many more public school teachers specialize in a single subject area than do their counterparts in the private sector. As a result, their teaching loads are significantly lighter. All else being the same, the difference implies that unit costs in the public system are 28 percent higher than in private schools in lower secondary education and 45 percent higher at the upper secondary level. Clearly, any policy for cost management would need to review this situation and evaluate the implications for teacher training and development and perhaps also for teacher incentives.

Enhancing student learning

As noted earlier, Malagasy pupils perform well relative to children in other low-income countries. Yet in absolute terms their scores are low, with children correctly answering only half of the test items in mathematics and French. Examination pass rates remain low, as well. Comparison between public and private schools suggests that while social selection does account in part for the superior performance of the private sector, a significant portion of the difference can be traced to differences in the effectiveness of school management. Looking within the public system itself, the results suggest that while there is a positive relation between school inputs and student learning, there is great diversity across schools; schools with the same level of spending per student may achieve widely different outcomes. What this implies is a lack of sufficient management oversight of the pedagogical process in schools and classrooms. A challenge in this area is therefore to equip teachers with skills for more effective teaching while also putting in place a system of accountability to motivate the application of those skills.

Responding to the Challenges

This report attempts to offer a broad diagnosis of the main issues in the education sector in Madagascar. As indicated at the outset, its coverage is selective, and the results must clearly be viewed within the country's broader context of human capital development. This context includes policies pertaining to two areas specifically excluded here, nonformal education and early childhood development.

Even more important, as a diagnostic product, the report is only a first step toward policy development. That process must begin with a broad discussion among interested parties concerning the assessment of the system's strengths, the challenges it faces, and the options for moving forward. The discussion is needed not just because it has become fashionable to talk about participatory approaches to poverty reduction and policy development but, rather, because the business of education naturally involves a myriad of actors, each with a specific contribution to make. Everyone must pull in the same direction for the system to move forward, and the process of dialogue is needed to clarify and agree on roles.

The central ministries will obviously have key parts in leading and shaping the dialogue. In the areas in which they exercise direct control, as in staffing and resource allocation across schools and institutions, there is much scope for action to improve the management of the system. The ministries also recognize the importance of partnerships and local management of the educational process. The concept of *contrats-programmes* has been launched at the primary and secondary education levels and may be extended elsewhere in the system. As with all innovations, including those that may be motivated by the findings of this report, a system of monitoring and evaluation is needed to provide feedback to enable adjustment as plans are implemented and their impact materializes. The process of learning by doing is a critical ingredient in policy reform and needs to be put in place even as discussions get under way on the future direction for educational development in Madagascar.

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Demographic and Macroeconomic Context

Madagascar's abundant and unique natural resources hold great potential for improving the livelihood of her population. (See Box 1.1 for basic country information.) Since the mid-1980s various economic reforms have been launched to reverse the downward spiral of the economy over the past 40 years. Although the reforms have yet to produce a pattern of consistent and strong growth, signs of an upturn are beginning to emerge. Given the anemic economy, the state's investment in education has been modest at best, and even that meager amount suffered cutbacks during periods of fiscal austerity, as exemplified by the pattern of spending in the 1990s. Hopeful signs for the decade to come are the Malagasy government's explicit commitment to poverty reduction (Madagascar 2000d) and the Heavily Indebted Poor Countries (HIPC) Initiative recently embraced by the international community. A fundamental principle underlying the initiative is that countries benefiting from it would commit to using the resources freed up by debt reduction to expand and improve investments in the social services, including education. The underlying assumption is that such investments are essential for achieving sustainable and sustained poverty reduction.[1]

What, given these developments, is the scope for increasing resources for education in Madagascar? How can the resources—those currently allocated and any extra that might become available—be used to maximum effect? This chapter focuses on the first question by examining relevant features of Madagascar's demographic and macroeconomic context. It sets the stage for subsequent chapters, which take up the second question in greater detail.

The Demographic Context

Madagascar's population in 1999 was estimated at 14.6 million, up from 5.6 million at the country's independence in 1960. As in most low-income countries, the rate of population increase has been and continues to be high, averaging 2.4 percent a year in the two decades following independence and accelerating to just under 3.0 percent a year in the 1990s (Table 1.1). This rate of growth is projected to continue into the next decade and a half, in contrast to the projected growth rate of 2.2 percent a year for Sub-Saharan Africa as a whole and 1.3 percent a year in other low-income countries (World Bank 2000d).

In most high-growth populations, young people make up a sizable share of the population, and Madagascar is no exception. For example, children of primary school age (6- to 10-year-olds) account for 13 percent of the total population.

An estimated 75 percent of the population lives in rural areas, where agriculture is the main source of livelihood and employment. About 40 percent of the urban population lives in Antananarivo, the capital city. Most people there are engaged in petty trade in the informal sector.[2]

As Table 1.1 shows, poverty is rampant in Madagascar, and the situation has deteriorated over the past few decades. Whereas an estimated two-fifths

Box 1.1
Madagascar at a Glance

Geography. Madagascar is an island nation located in the Indian Ocean off the southeast coast of the African continent. With a surface area of 592,000 square kilometers, it is the fourth-largest island in the world, after Greenland, New Guinea, and Borneo. The country has diverse soils and climates and many species of plants and animals found nowhere else in the world. Parts of Madagascar are vulnerable to drought and cyclones, and the environment is under increasing stress from massive deforestation as trees are cut for fuelwood.

People. Most of the Malagasy people trace their origin to ancestors from Africa and Indonesia. The two main ethnic groups, the Merina and the Betsileo, representing 26 and 12 percent, respectively, of the population, are mostly of direct Indonesian origin and live in the central highlands. The other major ethnic groups live mainly in the coastal areas. They include the Betsimisaraka in the east (about 15 percent of the population), the Tsimehety in the north (7 percent), and the Antandroy in the south (5 percent).

Economy. With a per capita gross domestic product (GDP) of US$235 in 1999, Madagascar is one of the poorest countries in the world. Agriculture is the dominant economic activity, employing three-quarters of the work force and yielding about one-third of the country's GDP. The creation of export-processing zones in 1990—part of a policy of attracting foreign investment by offering favorable tax breaks to qualified companies—is helping to expand the country's modest manufacturing sector in such areas as textiles, clothing, essential oils and essences, woodcrafts, sisal, and fisheries. Tourism and mining are potential high-growth sectors.

Political system. After decades of French rule, Madagascar became fully independent in June 1960. The country is now organized as a republic with a pluralist, democratic constitution that was approved by referendum in 1992. Political power is wielded at three levels: the presidency, the national assembly, and local and regional authorities. Both the president and the members of the national assembly are elected by universal suffrage. Constitutional changes approved in March 1998 are expected to strengthen the presidency and expand the role of local authorities. The political landscape is complex, with shifting alliances among the many parties.

Relations with the World Bank. Madagascar became a member of the World Bank in 1963 and received its first loan in 1966. Since then, the Bank has provided policy advice, technical assistance, and project and program financing to support the country's economic development. Total cumulative lending to date amounts to more than US$1.6 billion. Of this, completed projects account for US$650 million, US$550 million is for projects still being implemented; and US$400 million is for economic adjustment operations.

Source: World Bank (1999); Economist Intelligence Unit (2000).

Table 1.1
Population and Incidence of Poverty, Madagascar, 1962–97

						Annual percentage change[b]	
	1962	1975[a]	1980	1993[a]	1997	1960–80	1990–99
POPULATION							
Total size (millions)	5.7	7.6	8.7	12.2	13.7	2.4	2.9
Of primary school age (6–10)	—	—	—	1.6	1.8	—	2.9
Share in rural areas (percent)	—	84	—	77	77	—	—
SHARE OF POPULATION LIVING IN POVERTY[c]							
All Madagascar	43	—	47	70	75	..	..
Urban areas	—	—	—	65	68	..	..
Rural areas	—	—	—	72	78	..	..

— Not available.
.. Not applicable.
a. Population census years. The dates shown in the other columns coincide with the dates for which data on the incidence of poverty are available.
b. Growth rates are computed based on the population sizes reported in IMF (2000) for the end years of the indicated periods; growth of the school-age population is for the period 1993–99.
c. Defined as those unable to afford a food basket yielding the equivalent of 2,100 calories per day and to satisfy minimum nonfood needs.
Source: For overall population size, IMF (2000); for size of the primary-school-age population, Ministère de l'Enseignement Secondaire et de l'Education de Base (MINESEB) data files; for share of population living in poverty, Madagascar (2000d); for share of population in rural areas, Madagascar (1997c, 2000d).

of the population lived below the poverty line in 1962, the proportion had risen to three-quarters by 1997. With such a high overall rate of poverty, the share of poor people is high in both rural and urban areas.

Despite the country's poverty, most of Madagascar's health indicators show up favorably against those of other Sub-Saharan African countries. Average life expectancy at birth was about 58 years in 1998, as against an average 52 years for Sub-Saharan Africa, and the under-five mortality rate was about 162 deaths per 1,000 live births in 1997, compared with an average for the region of 147 deaths (World Bank 2000c). The World Bank estimates, however, that half of all children under age 5 are malnourished (World Bank 2000c).

The prevalence of HIV/AIDS is still relatively low, with an estimated infection rate of about 0.13 percent in the population age 15 and above (World Bank 2000c). But there is no cause for complacency: experience in nearby countries such as Tanzania, Uganda, and Zambia shows how easily and rapidly the situation can get out of control in the absence of early preventive action. The government recognizes the risks and has taken some important precautions against an outbreak, including the establishment in 1988 of a national program to control sexually transmitted diseases and HIV/AIDS; the creation of a sero-surveillance system to gather data and monitor the situation; and the use of high-level publicity to increase general awareness of the disease and encourage changes in personal behavior to minimize its spread.

Economic Growth and Current Conditions

The dismal performance of the economy is the main reason for Madagascar's widespread poverty. Between 1970 and 1999 gross domestic product (GDP) grew at only 0.5 percent a year (Table 1.2), while the population increased at about 3 percent a year. As a result, per capita GDP (in 1997 prices) fell from US$473 in 1970 to US$227 in 1999, a decline of more than 50 percent. The poor performance of the Malagasy economy comes into particularly sharp relief in cross-country comparison: among the 33 African countries for which relevant data exist, Madagascar ranks near the bottom in growth of per capita GDP between 1970 and 1999, ahead of only Sierra Leone, Niger, and the Democratic Republic of Congo (World Bank 2000a). Not surprisingly, Madagascar now lags far behind countries that had the same or a smaller per capita GDP in the 1970s (Table 1.2).

Table 1.2
Economic Performance, Madagascar and Selected Countries, 1970–99

Country	Index of per capita GDP (Madagascar = 1.0) 1970	1999	Annual GDP growth rate, 1970–99 (percent per year)
Madagascar	1.0	1.0	0.5
(Per capita GDP, 1997 US$)	(473)	(227)	
Benin	0.9	1.7	3.3
Burkina Faso	0.5	1.1	3.6
Kenya	0.6	1.4	4.5
Lesotho	0.6	2.2	5.5
Zimbabwe	1.3	2.9	4.6
India	0.6	1.5	4.4
Indonesia	0.5	4.4	7.3
Pakistan	1.0	2.0	5.3

Source: World Bank (1999), updated with data for 1999 from the World Bank Statistical Information Management and Analysis (SIMA) database.

Given Madagascar's many endowments and natural advantages and the fact that demographic pressures are no greater than those experienced by other low-income countries, the poor performance of the economy must be laid squarely at the door of failed economic policies (World Bank 1999; IMF 2000). From the 1970s until the mid-1980s, the country pursued a development strategy based on economic nationalism, self-sufficiency, and pervasive state involvement in and control of economic production. Excessive government regulation not only distorted incentives and production but also discouraged the domestic and foreign investment needed to boost economic growth. The mid-1980s marked the beginning of new policies directed at fiscal and administrative reform, economic and financial liberalization, and disengagement of the state from direct economic production. Progress has been halting and was interrupted by political instability during 1991–93.

Efforts in these directions have been renewed since the mid-1990s, and signs of a turnaround are just beginning to emerge. For the first time in many years, real GDP growth has outstripped population growth, averaging 4.1 percent a year between 1997 and 1999, compared with only 1.9 percent a year in 1995–96. As a result, per capita income grew at about 1 percent a year during the period. The upswing is good news indeed, but it represents only the beginning of a trend that obviously would have to be sustained to produce tangible reductions in poverty. The World Bank estimates that bringing the poverty rate down to 32 percent would be possible only if GDP grew by about 7.5 percent a year over the next two decades (World Bank 1999).[3]

Overall Government Finances

Better management of government finances is an important part of efforts to renew economic growth. Tables 1.3 and 1.4 document changes in various indicators in this area over the past 10 years. The government depends to a significant extent on grants from external donors for its revenues, with this source representing one-quarter or more of total revenues for most years of the decade. Total revenues, including such grants, stood at 16.4 percent of GDP at the start of the 1990s but had fallen to 15.1 percent by 1999. The 1999 figure represents a recovery since mid-decade, when the share was barely over 11 percent. Current revenues (excluding grants) averaged less than 10 percent of GDP over the decade, with the lowest percentages again at mid-decade. Since 1997, the trend has shown a strong upturn, reflecting increases in income tax revenues generated by renewed economic growth and improved tax collection. To enhance the government's capacity to finance the country's many unmet development needs, the World Bank has suggested that by the late 2010s it would be desirable to raise current revenues (i.e., income from taxes and other domestic sources) to around 15 percent of GDP (World Bank 1999).

Turning to the expenditure side, Table 1.4 shows that total expenditures consistently exceeded total revenues, often by exceptionally large margins, for most of the decade 1990–99. In 1994, for example, total expenditures were 1.74 times the government's total receipts. Current spending—that is, total expenditure minus capital expenditure and debt service payment—represented between 53 and 65 percent of total spending throughout the 1990s and averaged

Table 1.3
Overall Government Revenue, Madagascar, 1990–99

	Total revenue			Current revenue		
Year	Billions of current Malagasy francs	As share of GDP (percent)	Index (1990 = 100)	As share of GDP (percent)	Index (1990 = 100)	Grants as share of total revenue (percent)
1990	752.8	16.4	100	11.8	100	26.9
1991	533.2	10.9	66	8.5	72	19.5
1992	752.6	13.5	82	9.8	83	26.0
1993	864.5	13.4	82	9.7	82	26.1
1994	1,035.9	11.3	69	8.3	70	26.5
1995	1,541.8	11.4	70	8.5	72	25.4
1996	2,090.7	12.9	79	8.7	73	32.7
1997	2,703.4	15.0	92	9.7	82	35.4
1998	2,864.3	14.1	86	10.6	90	24.4
1999	3,522.0	15.1	92	11.4	96	24.5

Source: Computed using data on government finance from the World Bank Africa Live Database and GDP data from the World Bank SIMA database; see also Appendix table A1.1.

Table 1.4
Overall Government Expenditure, Madagascar, 1990–99

	Total expenditure				Current expenditure[a]		Interest on all public debt		Interest on external debt	
		As share of GDP								
Year	Billions of current Malagasy francs	Percent	Index (1990 = 100)	As ratio of total government revenue	As share of total expenditure (percent)	As share of GDP (percent)	As share of total expenditure (percent)	As share of GDP (percent)	As share of total debt interest payment (percent)	As share of GDP (percent)
1990	784.1	17.0	100	1.04	53.4	9.1	8.9	1.5	68.3	1.0
1991	805.6	16.4	96	1.51	59.6	9.8	12.3	2.0	56.0	1.1
1992	1,120.9	20.0	118	1.49	58.8	11.8	17.1	3.4	40.3	1.4
1993	1,328.4	20.6	121	1.54	58.9	12.1	19.4	4.0	78.7	3.2
1994	1,803.6	19.8	116	1.74	64.8	12.8	27.3	5.4	94.0	5.1
1995	2,373.8	17.6	103	1.54	64.2	11.3	29.0	5.1	90.8	4.6
1996	2,883.4	17.8	104	1.38	59.1	10.5	26.3	4.7	82.8	3.9
1997	3,137.1	17.4	102	1.16	62.5	10.9	17.5	3.0	91.7	2.8
1998	3,819.2	18.8	110	1.33	56.2	10.5	14.5	2.7	84.2	2.3
1999	3,624.7	15.5	91	1.03	57.9	9.0	13.6	2.1	65.9	1.4

a. Total expenditure net of capital expenditure and debt service payment.
Source: Computed using data on government finance from the World Bank Africa Live Database and GDP data from the World Bank SIMA database; see also Appendix table A1.1.

around 10.8 percent of GDP over the decade. Current expenditures and current revenues match each other more closely than do total expenditures and total revenues. The table highlights the role of debt interest as a source of fiscal distress during the 1990s. In the most difficult years, at mid-decade, total debt interest payment accounted for nearly 30 percent of total government expenditure and for more than 5 percent of GDP. Most of the interest payment was to external creditors. The situation has improved considerably since 1997; by 1999 total interest payments had declined to 2.1 percent of GDP.

Overall Public Spending on Education

Total public spending on education averaged 2.5 percent of GDP over the 1990s, but there was substantial variation around that average. The share fell from a high of around 3.0 percent or more at the beginning of the decade to a low of 1.8 percent in mid-decade and then recovered to over 3.0 percent in the 2000 budget (see Table 1.5). Spending on education as a share of total public spending followed a similar U-shaped pattern, with highs of more than 17 percent at the beginning and end of the decade and a trough of 10–11 percent in the middle years. The share averaged around 14 percent over the decade and did not rise above 20 percent in any year.

As expected, most of the public spending on education is accounted for by current spending, in which teacher salaries are the main item. The share of current spending rose to a high of 96 percent in 1995, just when overall spending on education was squeezed, and fell to a low of 71 percent in 2000, when spending was rising again. The trend reflects the unsurprising fact that it has been easier to expand and contract capital spending than current spending in response to overall fiscal conditions. Thus, while total spending on education as a percentage of GDP bounced back in 2000 to the levels at the beginning of the 1990s, current spending as a percentage of GDP was still only 86 percent as high

Table 1.5
Overall Public Spending on Education, Madagascar, 1990–2000

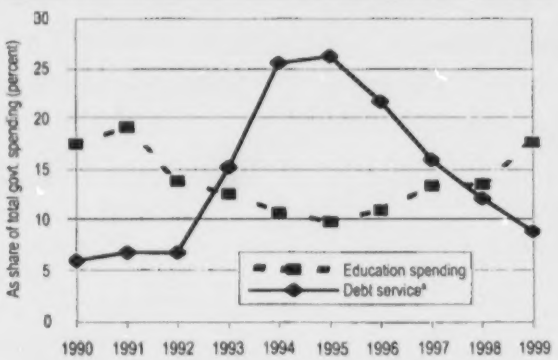
	Current and capital spending on education[a]				Current spending on education					
	As share of GDP		As share of total public spending		As share of total public spending on education		As share of GDP		As share of total current spending net of debt interest payment	
Year	Percent	Index (1990 = 100)	Percent	Index (1990 = 100)	Percent	Index (1990 = 100)	Percent	Index (1990 = 100)	Percent	Index (1990 = 100)
1990	3.0	100	17.6	100	85.9	100	2.6	100	28.3	100
1991	3.2	105	19.3	110	84.9	99	2.7	104	27.5	97
1992	2.8	93	13.9	79	85.0	99	2.4	92	20.2	71
1993	2.6	87	12.7	72	90.2	105	2.4	91	19.4	69
1994	2.1	71	10.8	62	91.5	107	2.0	76	15.3	54
1995	1.8	58	10.0	57	96.2	112	1.7	65	14.9	53
1996	2.0	66	11.1	63	85.9	100	1.7	66	16.1	57
1997	2.3	78	13.5	77	81.4	95	1.9	74	17.6	62
1998	2.6	85	13.7	78	81.8	95	2.1	81	19.9	70
1999	2.8	92	17.8	101	77.0	90	2.1	83	23.7	84
2000	3.1	103	—	—	71.1	83	2.2	86	—	—

— Not available.
a. Includes current and capital spending by the Ministère de l'Enseignement Secondaire et de l'Education de Base (MINESEB), the Ministère de l'Enseignement Technique et Formation Professionnelle (METFP), and the Ministère de l'Enseignement Supérieur (MINESUP), as well as the salaries of former national service personnel (*volontaires du service national*, or VSNs) paid until 1998 by local governments; the salaries of physical education teachers paid by the Ministère de la Jeunesse et du Sport (MJS); and central government transfers to communes for schools.
Source: Computed using data on public spending on education from Madagascar (various years, a) for 1990–92; Madagascar (various years, b) for 1993–96; Madagascar (various years, c) for 1997–2000; and GDP data from the World Bank SIMA database; for absolute amounts, see also Appendix table A1.2.

in 2000 as in 1990. Because the functioning of the education system depends on adequate levels of current spending, these trends suggest that the system's recovery from the fiscal austerity of the 1990s is probably still incomplete.

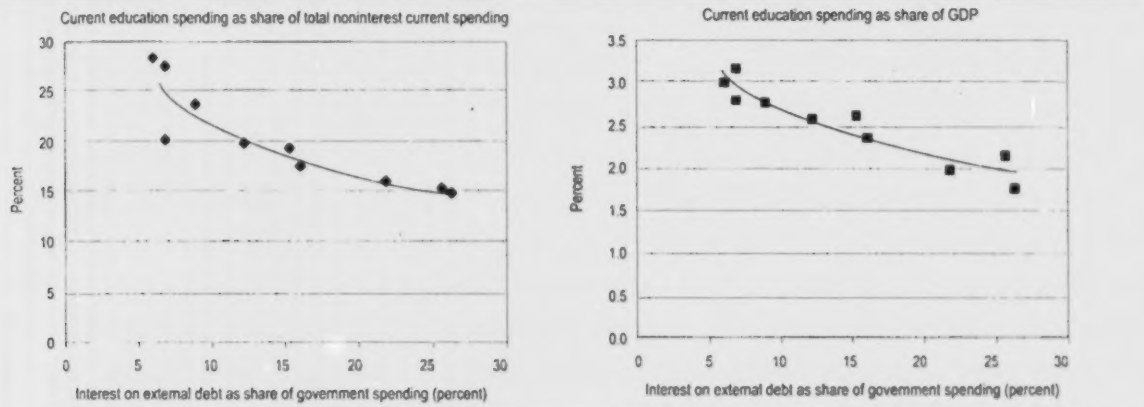
The pattern of public spending on education in Madagascar during the 1990s exemplifies the adverse impact that a heavy burden of external debt can have on the education sector. Figure 1.1 illustrates how as interest on the country's external debt mounted in mid-decade, the share of education in total government spending declined. Plotting education spending relative to the burden of debt service brings out the negative relation even more clearly (Figure 1.2). Not only was capital spending on education reduced; spending to support the day-to-day functioning of the system suffered the same

Figure 1.1
External Debt Service and Public Spending on Education, Madagascar, 1990–99



a. Refers to interest payment on external debt.
Source: Same as for Tables 1.4 and 1.5.

Figure 1.2
Relation between External Debt Service and Public Spending on Education, Madagascar, 1990–99


Current education spending as share of total noninterest current spending
Percent
Interest on external debt as share of government spending (percent)
Current education spending as share of GDP
Percent
Interest on external debt as share of government spending (percent)

Note: GDP, gross domestic product.
Source: Same as for Tables 1.4 and 1.5.

fate. The evidence thus suggests that the education sector absorbed a disproportionate share of the fiscal squeeze associated with debt service payment during the 1990s. Each percentage point rise in debt service as a share of total government spending reduced current spending on education as a share of total noninterest current government spending by 0.54 percentage points and reduced total spending on education as a share of GDP by 0.05 percentage points.

Prospects for Increased Spending on Education, and the Implications

Under the terms of the HIPC Initiative for debt reduction, there are good prospects for augmenting and protecting Madagascar's public spending on education. Currently, public expenditure in the sector amounts to about US$115 million a year, or 3.1 percent of GDP. Two simple calculations offer some insights into the scope for increasing the country's investment in education.

1. If external debt service as a percentage of total government spending fell from the current level of about 9 percent to, say, 3 percent, spending on education as a share of GDP could rise by an estimated 0.3 percentage points, assuming that the relation between debt service and education spending noted above holds. This would imply a rise in total spending on education to 3.4 percent of GDP.[4]

2. If by 2010 current revenues rose to the target of 15 percent of GDP suggested in World Bank (1999), and if current spending on education as a share of total net current spending were boosted to the 28 percent characteristic of spending shares in the early 1990s, current spending on the sector would rise to 4.2 percent of GDP. Inflows from external grants could conceivably add another 0.4 percentage points (the average difference between current and total education spending during the 1990s), bringing the share of education to 4.6 percent of GDP. The result is probably overly optimistic; increasing current revenues to 15 percent of GDP is an ambitious target, given that revenues never rose above 12 percent in any year during the 1990s. Using more realistic projections, and keeping in mind the competing demands on the country's small fiscal base, the result is a smaller potential increase in education spending. If revenues remain at 12 percent of GDP, for example, a 28 percent share for education implies that current spending on education would be 3.4 percent of GDP. Again adding 0.4 percentage points in resources from external grants, total spending on the sector would reach 3.8 percent of GDP.

Although both calculations offer only suggestive conclusions, they point in the same direction. That is, while extra resources for education are likely to materialize under the HIPC Initiative and as a result of the government's deliberate orientation of policies toward poverty reduction, it would probably be unrealistic to envisage that spending on education would rise to the Sub-Saharan African average of 4.2 percent of GDP. A more likely scenario is for future spending on education to range between 3.4 and 4.6 percent of GDP, with a greater tendency toward the lower end of the spectrum, perhaps averaging around 3.8 percent by 2010.

Whatever the size of the increase, the onus is on the education sector to use the extra resources efficiently and equitably. The challenge is illustrated in Figure 1.3, which shows cross-country patterns in the relation between public spending on education and educational outcomes. The data are for around 1993, the latest year for which comparable data are available for a sufficiently large number of countries.[5] Between 1993 and 1998 Madagascar's position remained roughly unchanged in comparative perspective: it is among the countries with a relatively modest level of public investment in education and with a correspondingly low level of educational outcomes as measured by average expected years of schooling of the school-age population. Noteworthy in the figure is that such countries as China, Colombia, Guatemala, Indonesia, Paraguay, the Philippines, and Sri Lanka, with levels of public investment in education comparable to Madagascar's, have achieved much better results.

Figure 1.3
Relation between Public Spending on Education and Expected Years of Schooling, Selected Countries, circa 1993

Note: Madagascar's position in the figure remains unchanged according to data for 1998. C.A.R., Central African Republic; GNP, gross national product.
Source: Based on data in Mingat and Suchaut (2000).

For Madagascar, therefore, the question is how to use any extra infusion of resources in a way that would help move the country's position in Figure 1.3 in an upward direction. Such a move would signal genuine progress toward extending the coverage of the system through greater efficiency in the use of all resources throughout the system. A move to the right in the figure, by contrast, would signal that most of the extra spending was being wasted. That risk cannot be ruled out, given the current functioning of the system, particularly in primary and secondary education. The remaining chapters of this report document these concerns and review options for addressing them.

Conclusion

Madagascar is a poor country whose sustained lack of economic progress over many decades has impeded investment in education. The 1990s were particularly difficult; to accommodate the government's mounting debt service obligations, public spending on education was cut, in both absolute and relative terms. By the end of the decade public spending on the sector, in particular current spending that supports the day-to-day functioning of the system, had yet to recover fully. At about 3.1 percent of GDP, current spending is modest in comparison with that in other low-income African countries. The prospects for an increase in spending from this rather low base are encouraging, especially in the context of the HIPC Initiative and the government's explicit acknowledgment of the role of education in its national poverty reduction strategy.

Although the extra resources are not likely to be large, Madagascar can nonetheless look to the example of other countries, particularly in Asia, where modest levels of spending have not prevented countries from expanding and improving their education systems, often with excellent results. The challenges for Madagascar are to iden-

tify the constraints on the functioning of its education system and to devise an effective strategy for overcoming those hindrances in the coming years.

Notes

1. The HIPC Initiative was launched in September 1996 by the World Bank and the International Monetary Fund with the endorsement of 180 governments around the world as a welcome approach for helping poor, severely indebted countries reduce debt as part of an overall poverty reduction strategy. In September 1999, at the Annual Meetings of the World Bank and the IMF, the HIPC Initiative was significantly expanded to provide more debt relief to more countries at a faster pace. This enhancement, and a redesigned strategy for linking debt relief to poverty reduction, are intended to help eliminate debt as an obstacle to development and allow countries to invest more in their future. For more details on the initiative and its application in specific countries, see the resources posted at <http://www.worldbank.org/hipc/faq/faq.html>. For an elaboration of Madagascar's poverty reduction strategy, see Madagascar (2000d).

2. For further information on the labor market and its characteristics, see Chapter 8.

3. Richard Jolly (n.d.) argues that a growth rate of 7.5 percent a year may not be needed if the development strategy puts more emphasis on policies that directly promote income-generating activities among the poor.

4. Recall that the data for the 1990s suggest that a 1 percentage point reduction in external debt service as a proportion of total government spending would reduce total public spending on education as a share of GDP by 0.05 percentage points.

5. For the sake of consistency, the figure relies on data for around 1993 reported in Mingat and Suchaut (2000). Because years of schooling were estimated from data on gross enrollment ratios, the results tend to be overstated, particularly in such countries as Madagascar, where the student flow pattern shows sharp drops in cohort survival rates in primary schooling and, to a lesser extent, in postprimary schooling. In Madagascar the available data on grade-to-grade survival rates (presented in Chapter 2) in fact show that average years of schooling were about 3.2 years in 1992 and 3.5 years in 1998, compared with the 4.6 years estimated in the Mingat and Suchaut study. Public spending on education in these years was 2.8 of GDP in 1992 and 2.6 percent in 1998.

2

Coverage and Structure of the Education System

This chapter documents the main features of Madagascar's education system in terms of student enrollments and their structural distribution. In addition to the common indicators of coverage, such as gross enrollment ratios, it presents detailed information on patterns of cohort survival, grade-specific enrollment, dropout, and grade repetition. The data suggest that although Madagascar's education system has historically provided wide coverage compared with systems in other low-income countries, its performance during the 1990s was uneven at best, resulting in stagnation during the decade. Much scope for improvement therefore exists as the country looks forward to the next decade of development in the sector. Specific attention to reducing dropout and grade repetition rates at the base of the educational pyramid appears to be warranted.

Aggregate Enrollment Levels and Trends

In the late 1990s Madagascar's education system enrolled some 2.5 million students, about 80 percent of whom were in primary school. Early childhood education is still relatively rare; approximately 109,000 three-to-five-year-olds attended preschool in 1998, which implies that perhaps only 1 first-grader in 10 currently enters the system with preschool experience.

The trends in enrollments presented in Table 2.1 show some interesting patterns in all subsectors (excluding preschool, for which data are available only for one year). In primary education, total enrollment stood at 633,000 in 1962. Within 13 years the number had swollen by 80 percent, to more than a million pupils, implying a growth rate of 4.5 percent a year between 1962 and 1975. In the following 15 years, to 1990, enrollment growth slowed to 1.9 percent a year. It picked up again only in the 1990s, with a growth rate of 3.2 percent a year during the decade. The explosive growth of enrollments during the 1960s and early 1970s occurred in the context of a deliberate government policy to ensure that each of the country's 11,000 fokotanys (neighborhoods or communities) had at least one public primary school (UNDP 1999). The early focus on primary education made Madagascar among the few low-income countries that achieved notable progress in basic education at the time.

In secondary education the available data pertain to the 1990s. The subsector as a whole enrolled only slightly more students in 1998 than in 1990, reflecting modest growth at the lower secondary level and an absolute decline at the upper secondary level. Vocational and technical education and training has traditionally enrolled relatively few students, but during the 1990s it seems to have been the only subsector beyond postprimary education that registered an absolute increase in enrollments. Higher education showed the most dramatic trend of all subsectors in the 1990s; enrollments in traditional institutions fell by nearly half, from about 36,000 students in 1991 to less than 21,000 in 1999.[1] A sizable number of students

Table 2.1
Trends in Enrollments by Level and Type of Education, Madagascar, 1962–99

Year	Preprimary[a]	Primary[b]	General secondary		Vocational/ technical[c]	Higher	
			Lower	Upper		Traditional[d]	Distance
1962	—	633,000	—	—	—	—	—
1975	—	1,133,013	—	—	—	—	—
1980	—	1,504,168	—	—	—	—	—
1986	—	1,480,728	—	—	—	37,475	0
1990	—	1,512,322	259,178	72,060	16,947	—	0
1991	—	1,570,431	256,989	64,783	15,174	35,824	0
1992	—	1,497,245	235,322	58,399	—	—	0
1993	—	1,490,317	243,705	61,091	—	33,375	9,306
1994	—	1,504,670	237,909	60,332	—	27,319	9,208
1995	—	1,511,865	235,766	57,813	—	22,430	8,268
1996	—	1,638,187	232,817	56,316	—	21,201	8,031
1997	—	1,731,813	250,858	56,416	18,592	19,376	8,133
1998	108,947	1,892,945	273,613	60,637	—	21,284	8,260
1999	—	2,012,423	—	—	—	20,522	7,279

— Not available.
a. Includes preschool enrollments in public primary schools *(écoles primaires publiques)*, public preschool centers *(centres d'activités préscolaires)*, and private establishments.
b. Note that before 1980 the primary cycle was six years; it was then changed to five years. The enrollment data would therefore be smaller in the earlier years if adjusted for the difference in duration of the cycle.
c. Includes enrollments in all public and private institutions offering initial training.
d. Data refer only to enrollments in public institutions.
Source: For data on preprimary education, Madagascar (1999a); for primary education in 1962 and 1975, UNDP (1999: 30); for primary education in 1980 and 1986, *World Development Indicators 2000*; for primary and secondary education for remaining years, MINESEB data files; for vocational/technical education and training, METFP data files; and for higher education, MINESUP data files.

enrolled in distance courses offered by the Centre National de Télé-Enseignement de Madagascar (CNTEMAD), which opened in 1993.

Public and Private Sector Roles in Education

Private schools enroll a sizable share of students throughout the education system (Table 2.2): more than half the enrollments at the preschool level, a fifth at the primary level, nearly half at the secondary level, almost three-fifths in vocational training and education, and about a tenth in higher education.[2] Most of the private preschools and primary and secondary schools belong to networks connected to various Christian denominations and two secular associations, with Catholic schools being dominant.[3] As will be documented in greater detail in the next chapter, private schools do receive government subsidies, but the amount is relatively modest. Most private schools therefore rely on fees and other private sources of income, including direct foreign donations, to maintain their operations. In higher education the private sector is made up of an eclectic assortment of service providers ranging from nonprofit indigenous associations to operators with overseas connections. The services offered by the private sector at this level are also more varied in terms of fields of study, certification, and duration.

In primary and secondary education the contrasting trends in the private sector's share of

Table 2.2
Share of Enrollments in the Private Sector, Madagascar, 1986–98
(percent)

Year	Preprimary	Primary	Secondary		Vocational/ technical	Higher (traditional)
			Lower	Upper		
1989	—	17	33	41	45	—
1990	—	18	34	42	41	—
1991	—	22	38	44	—	—
1992	—	22	40	48	—	—
1993	—	21	43	50	—	—
1994	—	22	45	51	—	—
1995	—	21	44	51	—	—
1996	—	21	46	49	—	—
1997	52	22	45	49	56	—
1998	—	22	45	49	—	11

— Not available.
Source: For primary, secondary, and vocational/technical education, MINESUP data files; for preprimary education, Madagascar (1999a); for higher education, authors' estimates based on data supplied by the MINESUP for 10 of the 17 accredited private institutions existing in 1998.

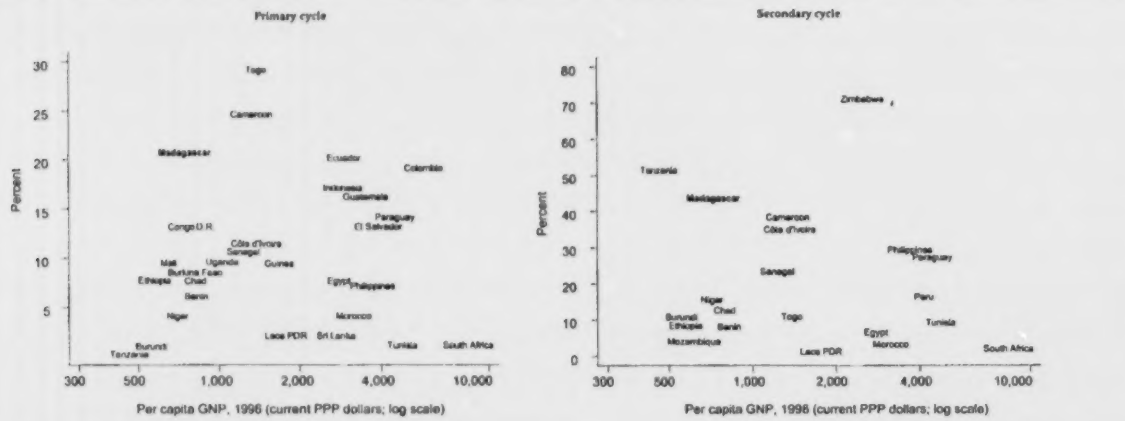
enrollments are noteworthy. In the primary cycle the share remained stable at around 21 to 22 percent throughout the 1990s, implying that transfers between the two sectors were probably quite limited and that both sectors lost and gained pupils at about the same rate as overall enrollments evolved during the decade. In secondary education the picture is different: while total enrollments stagnated during the period, the share of private schools rose, implying that significant numbers of students had been transferring from public to private schools. Although the data are much too aggregated to support firm conclusions, they do highlight the deterioration of services in public secondary schools in recent years as a possible issue. It is important to note, however, that the increase in the private sector's share began to flatten out after the mid-1990s, suggesting possible market saturation under current arrangements for school finance.

The foregoing patterns are not surprising when private education in Madagascar is viewed in comparative perspective. In both primary and secondary education, private schools in Madagascar account for a larger share of enrollments than in other countries (Figure 2.1); at the primary level only Cameroon and Togo in the sample have higher shares; and at the secondary level the share in Madagascar is exceeded only by the shares in Tanzania and Zimbabwe. By any comparison, therefore, private education at both the primary and secondary levels in Madagascar is already relatively well developed. The implication is that unless market conditions change dramatically, the current distribution of enrollments in public and private schools is probably quite stable.

Levels and Trends in Gross Enrollment Ratios

The gross enrollment ratio is a common measure of coverage that is computed as the number of pupils at each level of education divided by the population in the corresponding age group.[4] The published data in Table 2.3 suggest that as far back as three decades ago Madagascar's system, particularly at the primary level, was already reasonably broad in coverage. The gross enrollment ratio at the primary level rose from 81 percent in 1970 to a peak of 130 percent in 1980. It then began declining, to 120 per-

Figure 2.1
Share of Private Schools in Primary and Secondary Enrollments, Selected Countries, circa 1996


Primary cycle
Percent
Per capita GNP, 1996 (current PPP dollars; log scale)
Secondary cycle
Percent
Per capita GNP, 1998 (current PPP dollars; log scale)

Source: For data on private share of enrollments in African countries, ADEA (1999); for private share in other countries, World Bank EdStats database; for data on per capita gross national product (GNP) in purchasing power parity (PPP) dollar terms, *World Development Indicators 2000*.

Table 2.3
Gross Enrollment Ratios by Level of Education, Madagascar, 1970–98
(percent)

Year	Primary	Secondary	Higher
1970	81.3	10.3	1.01
1975	91.8	13.1	1.2
1980	130.2	—	2.6
1985	120.3	28.4	3.9
1990	103.6	18.0	3.0
1991	96.5	16.3	3.2
1992	93.5	16.7	3.4
1993	91.5	16.1	2.8
1994	89.6	15.5	2.3
1995	94.6	15.6	2.2
1996	97.3	—	2.0
1997	103.6	—	—
1998	107.3	16.0	2.1

— Not available.
Source: For primary education in 1970–90, and for secondary and higher education in 1970–97, UNESCO database; for primary education in 1990–98, MINESEB estimates; for secondary and higher education in 1998, authors' estimates based on enrollment data for that year.

cent in 1985 and 104 percent in 1990, and bottomed out at 90 percent in 1994 before rising to 107 percent by 1998. The trough in the early to mid-1990s corresponds to the squeeze on enrollments documented above. In secondary education the ratio climbed from just over 10 percent in 1970 to a high of about 28 percent by the mid-1980s. That expansionary trend was not sustained, and throughout the 1990s the share has remained unchanged at around 16 percent. In higher education the gross enrollment ratio also peaked in the mid-1980s at nearly 4 percent, but by 1998, it had fallen to only 2 percent, reflecting the sharp contraction of enrollments noted earlier.

Madagascar's gross enrollment ratio for primary education in 1996 (the latest year for which comparative data are available for a large number of countries) exceeds the average for low-income Sub-Saharan Africa, as well as that for all low-income countries (Table 2.4). For secondary and higher education. Madagascar's indicators are smaller than those for either country grouping. The gap is particularly noticeable when Madagascar is compared with low-income countries in general rather than with only low-income countries in Africa: the ratio of secondary education is then only half as high, while that for higher education is only two-fifths as

Table 2.4
Gross Enrollment Ratios, Madagascar and Selected Countries and Regions, circa 1996

Country or region	Primary	Secondary	Higher
Madagascar	**97**	**16**	**2.0**
Bangladesh	79	19	3.8
India	102	49	7.8
Laos PDR	107	25	2.1
Nicaragua	103	41	8.7
Country group average			
Low-income Sub-Saharan African countries	74.9	20.0	1.9
(Number of countries in sample)	(27)	(23)	(17)
All low-income countries	84.0	33.1	5.2
(Number of countries in sample)	(42)	(37)	(30)

Source: UNESCO data.

high. The comparison with selected low-income countries (Bangladesh, India, Laos People's Democratic Republic [PDR], and Nicaragua) brings out the differences even more clearly. Thus, while Madagascar's education system has relatively good coverage at the primary level, progress at postprimary levels appears to be quite a bit narrower than in other low-income countries.

Grade-to-Grade Student Flow Profiles in Primary and Secondary Education

Gross enrollment ratios provide a broad gauge of an education system's coverage, but they suffer from two flaws that prevent them from painting a sufficiently accurate picture for policy purposes.[5] These shortcomings stem from the dropout and grade repetition phenomena. In the first place, the gross enrollment ratio is computed as an average across all grades in a cycle of schooling, with implicit weighting by enrollment shares across the different grades. Where dropout is prevalent, the lower grades within a cycle tend to enroll more students than the upper grades, so that weighting favors the former and produces an upward bias in the indicator. Second, the gross enrollment ratio is inflated in systems where grade repetition is common, given that the numerator in the ratio includes all students in the cycle regardless of age, whereas the denominator includes only the population in the age group associated with the cycle.[6] In Madagascar both dropout and grade repetition are common, making the gross enrollment ratio particularly inaccurate as a measure of coverage.

One solution to these problems is to document the pattern of cohort survival (the proportion of a cohort that survives from grade to grade) and the corresponding grade-specific enrollment rates (the proportion of a population cohort enrolled in each grade). Because they are disaggregated by grade, these indicators yield a sharper characterization of coverage of the education system. When combined with information on grade repetition, they also provide a means for ascertaining the efficiency of student flow in the system. The discussion below examines these aspects of Madagascar's student flow profile through the 5-year primary cycle, the 4-year lower secondary cycle, and the 3-year upper secondary cycle, for a total of 12 years of schooling.

Cohort survival rates

Strictly speaking, cohort survival rates should refer to the schooling career of true cohorts. However, in order to document the pattern over the entire 12 years of schooling, the calculations would have to be made using data pertaining to children who entered grade 1 at least 12 years ago. Even if the focus is limited to the primary cycle, the corresponding data would refer to first-graders who entered the system at least five years ago. Clearly, such information would be much too outdated for policy purposes.

An alternative is to construct the rates for a pseudo cohort using cross-sectional data on nonrepeaters by grade from adjacent school years. The advantage is that the calculations can then be made on up-to-date data (which in the case of Madagascar means data as recent as 1998–99). To illustrate, suppose that the number of nonrepeaters in grade 1 is 15,000 in year X and the number of nonrepeaters in grade 2 the following year is 13,500; the survival rate from grade 1 to grade 2 would then be 90 percent. Suppose the same computation for grades 2 and 3 yields a survival rate of 85 percent. These

results would imply a survival rate from grade 1 to grade 3 of 76.5 percent (= 0.90 × 0.85 × 100). By repeating the calculation for sets of adjacent grades, we obtain a complete pattern of survival for each grade in primary and secondary education. Because the data pertain to a cross-section of students for the selected years, the results describe the schooling career of a pseudo cohort rather than a real one, in the sense that they ignore differences across actual cohorts in terms of relative cohort sizes, entry rates to first grade, and continuation rates to subsequent grades.

Applying the above method to the data for Madagascar yields the results shown in Table 2.5. The pattern of student flow in 1998 implies that only 33 pupils in each entering cohort of 100 first-graders can expect to reach the end of the primary cycle; only 15 of them can expect to finish lower secondary school; and a mere 6 of the 100 can expect to finish upper secondary school. This pattern remained largely unchanged between 1992 and 1998 throughout the entire 12 years of primary and secondary schooling.[7]

Table 2.5
Cohort Survival Rates, Madagascar, 1992 and 1998

Cycle	Grade		1992	1998
Primary *(primaire)*	1	11 ème	1.00	1.00
	2	10 ème	0.71	0.70
	3	9 ème	0.57	0.58
	4	8 ème	0.40	0.43
			0.31	0.33
	5[a]	7 ème[a]	(0.28)	(0.28)
			(0.46)	(0.53)
Lower secondary *(collège)*	6	6 ème	0.20	0.22
	7	5 ème	0.15	0.18
	8	4 ème	0.12	0.16
	9	3 ème	0.11	0.15
Upper secondary *(lycée)*	10	2 ème	0.05	0.07
	11	1 ère	0.04	0.06
	12	*Terminale*	0.04	0.06

a. For 1992 and 1998, the figures in the first row (i.e. without parentheses) correspond to the system-wide rate of cohort survival from grade 1; the figures in the next two rows in parentheses correspond, respectively, to the rate of cohort survival from grade 1 in the public and private sectors.
Source: Authors' estimates based on data supplied by the MINESEB on the numbers of students and repeaters by grade. The results reflect three-year averages around the date shown for primary education and two-year averages for 1997 and 1998 for secondary education, for which 1999 data were unavailable at the time of data collection for this study.

The table presents separate estimates at the primary level for the public and private sectors. Although transfers between the two sectors may occur, they are unlikely to take place on a sufficiently large scale at the primary level to invalidate overall comparison of survival patterns. In both 1992 and 1998 the cohort survival rate is higher in the private sector. The more interesting finding, however, pertains to the trend over time: whereas the rate stagnated at 28 percent in public schools between 1992 and 1998, it climbed by 7 percentage points among private schools during the same period, reaching 53 percent by 1998.

Cross-country comparison puts the system's current performance in particularly sharp relief. Having a survival rate of only 33 percent places Madagascar near the bottom of a sample of 24 Sub-Saharan African countries for which the indicator was computed in Mingat and Suchaut (2000). In the early 1990s the average for francophone African countries was 65 percent, while the figure for anglophone African countries was 70 percent.

Grade-specific enrollment rates

The cohort survival rates presented in Table 2.5 pertain only to children who have entered the education system. To complete the picture on educational coverage, we need also to evaluate the proportion of children in each cohort who ever attend school. A common indicator is the intake rate in grade 1, which is computed by dividing the number of new entrants into grade 1 by the population at the official starting age for that grade. However, because some children enter earlier and others later than the official starting age, the calculation typically fails to provide an accurate estimate of the figure of interest.

For our purposes here, we rely instead on data from household surveys: the 1992 and 1997 Madagascar Demographic and Health Surveys, the 1993–94 *Enquête Permanente auprès des Ménages*, and the 1997 *Enquête Prioritaire auprès des Ménages*.[8] In all these surveys, for each child of school age in the sample household the question was asked whether the child had ever been to school. Using

this information, and restricting observations to various groupings of children in the age bracket 8 to 15 years, produce relatively stable estimates of cohort entry rates to grade 1—around 81 percent for both years.[9]

An entry rate of 81 percent places Madagascar among the better-performing low-income countries, but the advantage is squandered by the poor rates of cohort survival noted above. Multiplying the grade 1 entry rate by the survival rate to each subsequent grade yields the grade-specific enrollment rates reported in Table 2.6. These rates document the share of each population cohort enrolled by grade. The results for Madagascar imply a school life expectancy of about 3.2 years in 1992 and 3.5 years in 1998. In other words, if the pattern for 1998 persists long enough, future cohorts of young workers in the Malagasy economy will have, on average, only 3.5 years of formal schooling as part of their basic human capital profile.[10] This outcome is low compared with the averages of 5.6 years in Sub-Saharan Africa, 9.9 years in Latin America, and 7.9 years in low-income Asia (Mingat and Suchaut 2000). It is also poor in relation to older cohorts of the Malagasy population: among those age 30–35 who were surveyed in the 1997 *Enquête Prioritaire auprès des Ménages*, average length of schooling was 6.4 years. The comparison suggests that Madagascar's human capital base is in decline, with obvious adverse implications for the country's economic competitiveness in future generations.

Table 2.6
Grade-Specific Enrollment Rates, Madagascar, 1992 and 1998

Cycle	Grade		1992	1998
Primary *(primaire)*	1	11 ème	0.81	0.81
	2	10 ème	0.57	0.57
	3	9 ème	0.46	0.47
	4	8 ème	0.33	0.35
	5	7 ème	0.25	0.27
Lower secondary *(collège)*	6	6 ème	0.16	0.18
	7	5 ème	0.12	0.15
	8	4 ème	0.10	0.13
	9	3 ème	0.09	0.12
Upper secondary *(lycée)*	10	2 ème	0.04	0.06
	11	1 ère	0.03	0.05
	12	*Terminale*	0.03	0.05
Implied school life expectancy (years)[a]			3.2	3.5

a. Computed as the sum of the enrollment rates by grade, with the (generous) assumption that students in grade 12 eventually complete an average of four years of postsecondary schooling.
Source: For estimates of cohort survival rates, Table 2.5; for entry rates to grade 1, 1992 and 1997 Demographic and Health Surveys for Madagascar, 1993–94 *Enquête Permanente auprès des Ménages*, and 1997 *Enquête Prioritaire auprès des Ménages*.

Intercycle transition rates

The grade-specific enrollment rates documented above have implications regarding intercycle transition processes. As in most systems, there are two points of selection: between primary and lower secondary school, and between lower and upper secondary school. In Madagascar the rates of transition at both points are reasonably high: in 1998, for example, a fifth-grader had, on average, a 65 percent (= 0.22/0.33 × 100) chance of going on to lower secondary school, and a ninth-grader had a 46 percent (= 0.07/0.15 × 100) chance of proceeding to upper secondary school (Table 2.7). The corresponding rates in 1992 were only slightly lower. For comparison, Table 2.7 also shows data from around 1993 on transition rates between primary and lower secondary education for selected country groups. These data suggest that Malagasy fifth-graders are more likely than their peers in other African countries to continue to the next cycle of schooling.

It is important, however, to view the pattern of transition in Madagascar in the context of overall student flow. In a system in which so few first-graders reach the end of upper secondary school, the high rates of transition *between* cycles simply mean that selection in the system occurs largely through a process of dropping out *within* cycles of schooling. Recall that given the way the system was operating in 1998, only 6 children attained grade 12 for each cohort of 100 entering first-graders. Of the 94 who exited the system before reaching grade 12, an estimated 21 percent left at the interval between the two selection points, that is, between the primary and lower secondary cycles and between the lower and upper secondary cycles. For comparison, data for the mid-1980s (the latest year for which comparative data are available) for some of Asia's better-performing systems show a corresponding figure of 54 percent in China, 87 percent in the Republic of Korea, and 72 percent in Thailand (Tan and Mingat 1992).

Table 2.7
Intercycle Selection, Madagascar and Selected Regions, 1990s

Country or region	Intercycle transition rates (percent)		Percentage of selection occurring between cycles
	Primary to lower secondary	Lower to upper secondary	
Madagascar			
1992	63	42	18
1998	65	46	21
Regional averages, circa 1993			
Francophone Sub-Saharan Africa	50	—	—
Anglophone Sub-Saharan Africa	60	—	—
Latin America and the Caribbean	78	—	—
Asia	71	—	—

— Not available
Source: For Madagascar, Table 2.6; for regional averages, Mingat and Suchaut (2000).

Stated alternatively, the Malagasy system is currently geared toward producing substantial numbers of school leavers with incomplete schooling, even primary schooling. Because the curriculum at the primary level is typically designed to teach an integrated set of basic skills, partial completion of the cycle means a more than proportional loss in learning. In fact, the research literature suggests that a child needs at least four years of primary schooling to become permanently literate and numerate as an adult (see, for example, Lockheed, Verspoor, and associates 1991). Another adverse implication of the current pattern of cohort survival is that it reduces the pool of candidates—in both quantitative and qualitative terms—for selection for postprimary levels of education. Thus, as long as the current pattern of cohort survival persists, the country will lack the foundation for stimulating a meaningful expansion of secondary and higher education.

Grade repetition

In addition to cohort survival and grade-specific enrollment rates, the pattern of repetition is also an important aspect of student flow. In systems where students often repeat the same grade, each school leaver costs more to produce than in systems where repetition occurs less often. To the extent that repeaters do not learn more than nonrepeaters, the pattern amounts to a waste of resources.

Madagascar's education system, as in most francophone countries, is characterized by traditionally higher rates of repetition than in other low-income countries, African or otherwise. Even so, its rates are among the highest in the world, averaging 33 percent in the primary cycle in 1998, 18 percent in the lower secondary cycle, and 21 percent in the upper secondary cycle.

Looking more closely into the pattern of repetition by grade within Madagascar, several features are noteworthy (Table 2.8). In primary education, the repetition rates remained high in all grades for most of the 1990s, averaging between 25 and 40 percent. The pattern across grades and sectors has also remained relatively stable: first-graders are particularly prone to repeat grade 1, and in any grade, pupils in public schools repeat at between 1.5 times and 2.0 times the rate in private schools. There has, however, been a decline in repetition among first-graders in public schools: the rate in 1998, although still high at 42 percent, was a full 5 percentage points lower than six years earlier.

Turning to secondary schooling, the rates of repetition are again uniformly lower in the private sector, but the public-private gap is generally smaller. A further contrast to the pattern in primary

Table 2.8
Repetition Rates by Grade and Sector, Madagascar, 1992 and 1998

Cycle	Grade		1992 Overall	1992 Public schools	1992 Private schools	1998 Overall	1998 Public schools	1998 Private schools
Primary (*primaire*)	1	11 ème	0.41	0.47	0.20	0.38	0.42	0.20
	2	10 ème	0.31	0.33	0.20	0.30	0.33	0.18
	3	9 ème	0.31	0.34	0.19	0.31	0.35	0.20
	4	8 ème	0.25	0.27	0.19	0.26	0.28	0.18
	5	7 ème	0.32	0.35	0.20	0.30	0.34	0.20
	Cycle average[a]		**0.34**	**0.38**	**0.20**	**0.33**	**0.36**	**0.19**
Lower secondary (*collège*)	6	6 ème	0.17	0.18	0.15	0.16	0.18	0.13
	7	5 ème	0.14	0.15	0.13	0.12	0.13	0.11
	8	4 ème	0.16	0.18	0.13	0.14	0.16	0.13
	9	3 ème	0.33	0.37	0.28	0.32	0.37	0.27
	Cycle average[a]		**0.20**	**0.22**	**0.17**	**0.18**	**0.21**	**0.16**
Upper secondary (*lycée*)	10	2 ème	0.19	0.25	0.10	0.11	0.14	0.09
	11	1 ère	0.18	0.25	0.10	0.12	0.15	0.08
	12	*Terminale*	0.36	0.41	0.31	0.37	0.41	0.33
	Cycle average[a]		**0.25**	**0.31**	**0.18**	**0.21**	**0.24**	**0.18**

a. Figures reflect weighted averages of repetition rates across the various grades in each cycle. If the average were computed as the ratio of total repeaters to total enrollments in the cycle, the result would be largely the same except in primary education, where the corresponding figures in the row would be 0.38, 0.38, and 0.20 for 1992 and 0.36, 0.36, and 0.19 for 1998.
Source: Authors' calculations based on data supplied by the MINESEB on the number of students enrolled and the number of repeaters by grade.

schooling is that students throughout the system repeat the last grade in both cycles much more often than they do earlier grades. Some of the repeaters are probably held back because of insufficient progress in learning (accepting as valid the criteria currently used to make this judgment), but such students probably represented only around 14 to 16 percent of students in the lower secondary cycle in 1998 and 11 to 12 percent of students in the upper secondary cycle, given the levels of repetition in earlier grades in these cycles. That estimate would imply that as many as half of the repeaters in grade 9 and nearly two-thirds of those in grade 12 are repeating the grade simply to improve their chances of securing a place in the next level of education. The phenomenon is systemwide and suggests the existence of substantial excess demand for upper secondary education, and even more so for higher education.[11]

Important differences in repetition patterns nonetheless exist between the two cycles of secondary schooling. In lower secondary schools the overall repetition rates remained relatively stable during the 1990s; they are smaller in private schools by modest margins in all grades except the last, where the difference is 10 percentage points. In contrast, in upper secondary schools the repetition rates declined substantially in the first two grades of the cycle between 1992 and 1998, reflecting mostly the impact of a remarkable decline during the period in the public sector. Whereas the public-private gap in repetition rates in grades 10 and 11 was 15 percentage points in 1992, by 1998 the gap had fallen to between 5 and 7 percentage points. In other words, in the space of six years the rate of repetition in public upper secondary schools had been reduced by about 40 percent.

Indices of Overall Student Flow Efficiency

What do these patterns of cohort survival and grade repetition imply regarding the efficiency of student flow? This question can be answered by comparing two items: the resources that the system currently

uses to produce its graduates, and the resources that a system operating without dropout or repetition would need to produce the same number of graduates. The ratio between the two quantities provides a measure of the system's student flow efficiency. As is illustrated below, the index can be decomposed into two parts, one associated with dropout and the other with grade repetition.

Consider, for example, the data for the primary cycle in Table 2.9. Given the current rates of cohort survival and grade repetition in the cycle (as documented in Tables 2.5 and 2.8), and calibrating the calculations to a starting cohort of 1,000 pupils, the resources spent in grade 1 would amount to 1,608 pupil-years (= 1,000/[1 – 0.378]). In grade 2, only 696 of the 1,000 pupils would be left, which implies that the resources spent would be 987 pupil-years (= 696/[1 – 0.295]). Continuing in the same manner to grade 5, the cumulative resources spent would amount to 4,480 pupil-years (= 1,608 + 987 + 839 + 571 + 474). Given that the number of fifth-graders actually produced is 333, the resources needed to produce them in the absence of dropout and repetition would be 1,665 pupil-years (= 333 × 5). Thus, considering both sources of wastage, the system currently operates only 0.37 (= 1,665/4,480) times as efficiently as a system in which no one drops out or repeats a grade. When the calculation is done using dropout alone and ignoring grade repetition, a total of 3,029 pupil-years (= 1,000 + 696 + 576 + 425 + 333) is needed to produce the 333 fifth-graders, implying an efficiency index of 0.55 (= 1,665/3,029). Considering grade repetition alone, a total of 4,480 pupil-years was invested in producing them when only 3,029 would have been needed after allowing for dropouts; the corresponding efficiency index would be 0.68 (= 3,029/4,480).

An education system that operates with a 37 percent rate of efficiency is indeed quite inefficient. Dropout puts a heavier burden on the system than does grade repetition (as implied by the smaller index associated with the former problem), but on both sources of inefficiency, Madagascar compares unfavorably with the performance of other educa-

Table 2.9
Efficiency of Student Flow in Primary Education, Madagascar, 1998

Grade		Survivors from initial cohort of 1,000	Repetition rate	Pupil-years invested[a]
1	11 ème	1,000	0.378	1,608
2	10 ème	696	0.295	987
3	9 ème	576	0.314	839
4	8 ème	425	0.255	571
5	7 ème	333	0.299	474
Cumulative pupil-years		3,029		4,480
Cumulative pupil-years assuming no dropout or repetition		1,665[b]		
Source of inefficiency		*Summary indices of student flow efficiency[c]*		
Dropout		0.55		
Grade repetition			0.68	
Both sources			0.37	

a. See text for explanation of the computation.
b. Computed as the number of pupil-years invested in the 333 pupils who reached the end of cycle, cumulated over the five-year cycle.
c. Calculated as the ratio between cumulative pupil-years in systems with no dropout or grade repetition and cumulative pupil-years in systems characterized by either or both problems. See text for computation of the specific indices reported in this table.
Source: Authors' estimates based on the patterns of cohort survival and repetition reported in Tables 2.5 and 2.8.

tion systems. Data for 1993 indicate that the index of inefficiency associated with dropout was, on average, 0.80 for both francophone and anglophone Africa; the index associated with repetition was 0.76 for francophone Africa and 0.93 for anglophone Africa. Madagascar thus places near the bottom in terms of overall efficiency of student flow, as Figure 2.2 suggests.[12]

As a benchmark for the potential scope for improving the efficiency of student flow, consider the results in Table 2.10 showing the differences between the public and private sectors in Madagascar. Public schools currently operate at half the efficiency of private schools at the primary level, overall, with dropouts placing a bigger burden on the system than grade repetition. If the public schools could be upgraded to the same level of performance as private schools, Madagascar would rise to the middle of the range of performance across countries.

For completeness, the table also shows the efficiency of student flow in lower and upper secondary education. The indices are reasonably high, reflecting the fact that cohort survival rates are higher and repetition rates are lower than in the primary cycle. If the high end-of-cycle repetition in the two cycles fell to the average for the other years in the cycles, the indices would rise to 0.73 for lower secondary education and 0.84 for upper secondary education. Because repetition in the terminal years is often motivated by students' desire to improve their chances of entering the next cycle, its prevalence is likely to decline as educational opportunities open up in upper secondary and higher education, and the result will be a more efficient pattern of student flow.[13]

Table 2.10
Indices of Student Flow Efficiency by Cycle of Schooling and Sector, Madagascar, 1998

Education level	Source of inefficiency		
	Dropout	Repetition	Both sources
PRIMARY CYCLE			
Public schools	0.48	0.64	0.31
Private schools	0.74	0.81	0.60
Overall	0.55	0.68	0.37
SECONDARY CYCLE[a]			
Lower	0.85	0.81	0.69
Upper	0.95	0.79	0.74

a. Distinctions between public and private schools are less meaningful at the secondary level because of the increased possibility of student transfers between the two sectors.
Source: Authors' calculation based on student flow patterns reported in Tables 2.5 and 2.8.

Figure 2.2
Student Flow in Primary Schooling, Madagascar and Selected Countries, circa 1993

Note: C.A.R., Central African Republic; P.N.G., Papua New Guinea.
Source: Mingat and Suchaut (2000).

Policy Perspectives on Grade Repetition and Dropout in Primary Education

The high rates of repetition and dropout in primary education raise two related policy questions. The first pertains to whether the costs associated with repetition and dropout are outweighed by the possible pedagogical benefits. It is obvious that dropout is wasteful, since it reduces the likelihood that a child will become permanently literate and numerate. There may be more of a case for pedagogical benefits from grade repetition, on the argument that it helps lagging pupils acquire the preparation needed for academic progress in the next grade. Yet grade repetition may also make it harder for children to complete their schooling because families, especially poor ones, rely on their children to perform many household and farming tasks. The second policy question is more practical: if dropout is wasteful, what are its underlying causes, and how can it be reduced?

Grade repetition and schooling outcomes

The evaluation should ideally be based on longitudinal data that track the individual pupil's progression from the start of one school year to the start of the next. Lacking such data, we rely below on some simple regressions based on cross-country data from the 1990s to examine the relation between the prevalence of repetition in an education system, the share of first-graders who persist to the end of the cycle, and student achievement. The results appear in Table 2.11.

Consider first the results pertaining to the correlates of the survival rate. A country's per capita gross national product (GNP) is consistently a strong predictor of the cohort survival rate. Controlling for differences in this variable, one might expect systems with high first-grade entry rates to have lower survival rates because they are inherently less selective. Yet this is not borne out in either regression. The repetition rate, however, exerts a

Table 2.11
Correlation between Grade Repetition in Primary Education, Survival Rates, and Student Achievement

	Survival rate to end of primary cycle		Index of student achievement[a]	
Independent variable	Model 1	Model 2	Model 1	Model 2
Entry rate to grade 1	–0.08	0.05		
	(0.60)	(0.29)		
Enrollment rate at end of primary cycle			0.26***	0.26***
			(3.43)	(2.94)
Percentage of repeaters in primary cycle	–0.84***	–0.88***	0.23	0.28
	(3.41)	(3.18)	(1.44)	(1.47)
Ln (per capita GNP)	5.97***	5.53**	2.50*	2.97*
	(2.36)	(2.09)	(1.73)	(1.90)
Public spending per pupil as percentage of per capita GNP[b]		41.75		–0.03
		(1.22)		(0.00)
Constant	49.7	38.3	2.37	–6.56
Number of observations[c]	64	57	34	34
Adjusted R^2	0.26	0.29	0.34	0.31

* Statistically significant at the 10 percent confidence level.
** Statistically significant at the 5 percent confidence level.
*** Statistically significant at the 1 percent confidence level.
Note: GNP, gross national product. Numbers in parentheses are *t*-statistics.
a. Based on data pooled from various international assessments of achievement in the late 1980s and 1990s among children age 8–12 as reflected in test scores for science and mathematics.
b. Refers to spending at the primary level.
c. Regressions based on countries with per capita GNP not exceeding US$4,000 in 1993.
Source: Authors' estimates based on cross-country data for the 1990s reported in Mingat and Tan (1998) and Mingat and Suchaut (2000).

consistently strong negative influence; each percentage point increase in the repetition rate is associated with a 0.84 to 0.88 percentage point decline in the survival rate. The results also suggest that differences in public spending per primary pupil have no significant effect, implying that the way resources are used is at least as important as the amount of resources available.

Let us turn now to the second set of regressions pertaining to the correlates of student learning. As expected, richer countries in the sample (which includes only countries with 1993 per capita GNP below US$4,000) tend to achieve better outcomes.[14] The results also show that all else being the same, grade repetition is positively correlated with student achievement but that the relation is not statistically significant. As before, per pupil spending in primary education has no impact on learning. We again interpret this result as indicating the importance of how resources are used. Finally, the results show that the enrollment rate at the end of the primary cycle—a measure of the overall quantitative development of the system—is consistently and strongly correlated with student learning.

Tentative as these results are, they suggest that although grade repetition may be pedagogically appropriate for selected pupils with genuine learning difficulties, its prevalence on a large scale—as is the case in Madagascar—does not necessarily produce the expected pedagogical benefits. In fact, not only is there no relation between repetition and learning; high rates of repetition actually harm the system by making it more likely that pupils will abandon their schooling before completing the cycle—that is, before they can acquire permanent literacy and numeracy.

Dropout as a function of demand- and supply-side factors

In the literature on household behavior, the decision to attend school is typically modeled as a function of the costs and benefits of schooling that are perceived and incurred by a child's family. Costs include both the direct outlays associated with schooling and the opportunity costs stemming from the loss of a child's labor while he or she is at school. Benefits encompass the expectation of increased personal and household productivity. Household income and preferences obviously affect families' schooling decisions, but many of the demand-side factors are also influenced by aspects of service delivery. For example, the availability of schools near children's homes encourages attendance by lowering transport costs and minimizing travel time; the incidence of grade repetition discourages attendance by increasing its opportunity cost; the timing of the school calendar can often affect the opportunity cost of schooling through its match (or conflict) with the pattern of demand for child labor over the agricultural cycle; the design of the curriculum can promote school attendance to the extent that it responds to families' expectations regarding the relevance and productivity of schooling; and so on. Although an examination of the full interplay of factors influencing school attendance is beyond the scope of this study, the data at our disposal permit assessment of the impact of a supply-side factor that has been found to be important in other settings: children's access to a complete cycle of instruction.[15] In localities where the full cycle of instruction is unavailable, dropouts are, in effect, "pushouts." The implication is that interventions to address this constraint on the supply side can be effective in reducing the dropout rate.

In Madagascar at least one primary school can be found in practically all of the country's 11,000 *fokotanys*, but because of teacher shortages some schools are unable to offer the full five grades of instruction in the cycle, even after making arrangements for multigrade teaching. Table 2.12 shows the distribution of *fokotanys* according to the highest grade of instruction offered by their primary schools, as well as the corresponding distribution of new first-graders.[16] According to these calculations, 18.8 percent of the children in each cohort do not have access to a full cycle of instruction and are therefore forced to abandon their schooling even if they had wanted to continue.

Improving access to complete cycle of schooling and reducing grade repetition

On the basis of the above assessments, we can simulate the impact of removing two important

Table 2.12
Access to Complete Cycle of Instruction at the Primary Level, Madagascar, 1998

Highest grade of instruction available	*Fokotanys* (neighborhoods)			New first-graders		
	Number	Percentage	Cumulative percentage	Number	Percentage	Cumulative percentage
1	130	1.6	1.6	7,117	1.7	1.7
2	368	4.5	6.0	10,626	2.6	4.4
3	1,203	14.5	20.6	33,149	8.1	12.5
4	802	9.7	30.3	25,662	6.3	18.8
5	5,766	69.7	100.0	330,397	81.2	100.0
All	8,269	100.0		406,951	100.0	

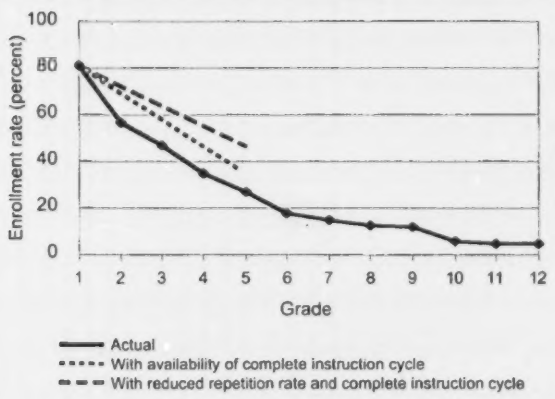
Source: Authors' estimates based on school census data for 1997–98.

constraints on better schooling outcomes in Madagascar (Figure 2.3). Ensuring that children in all neighborhoods have access to a complete cycle of schooling at the primary level would raise the rate of survival to the end of the primary cycle from its present level of 33 percent to 41 percent (= 33/[1 – 0.188]), implying a grade 5 enrollment rate of 33 percent instead of the current 27 percent. If the calculations used individual schools instead of *fokotanys* as units of observation, the results would be even better, with a survival rate of 46 percent and a grade 5 enrollment rate of 37 percent (Figure 2.3).

If, in addition, the overall incidence of repetition were reduced from the current 31 percent to, say, 15 percent, the cohort survival rate would rise by about 14 percentage points, based on the coefficient estimate reported in Table 2.11. By implication, the grade 5 enrollment rate would rise to about 46 percent.

While these results identify two promising avenues for intervention to improve Madagascar's student flow profile, it is important to recognize that their combined impact would still leave the country with much room for improvement. More than 40 percent of first-graders would still continue to leave the system before completing their primary schooling. Because of lack of data, it is beyond the scope of this study to explore the nature of other potential interventions, but experience elsewhere suggests the need for a system of experimentation and evaluation of possible options relevant to the Malagasy context. This might include, for example, encouraging more flexible management of the school calendar at the local level, improving classroom and pedagogical facilities, targeting subsidies to poor communities and households, and so on.

Figure 2.3
Impact of Making Complete Cycle of Instruction Available and Reducing Repetition Rate, Primary Education, Madagascar, 1998



Note: The solid line indicates the student flow pattern in 1998, with an enrollment rate of 27 percent in grade 5. The dotted line indicates the impact of making available complete cycles of instruction in all *fokotanys* (neighborhoods), which would raise the grade 5 enrollment to about 35 percent. The dashed line indicates the impact of also reducing the repetition rate in the primary cycle to 15 percent, or about half the current rate of 31 percent. The result would be to raise the grade 5 enrollment rate even further, to about 46 percent.
Source: Authors' estimates based on school census data for 1997-98 and simulations discussed in text.

Conclusion

This chapter has presented an overview of the coverage of Madagascar's education system, documenting the size of enrollments across levels of education, the evolution of enrollments over time, and the distribution of enrollments across the public and private sectors. In gross enrollment ratios, Madagascar is slightly ahead of other low-income countries at the primary level but behind them at postprimary levels. Yet the high gross enrollment ratio in primary education masks significant problems of student flow in this cycle. Although entry rates to grade 1 are respectably high (more than 80 percent), most entrants fail to complete their schooling. Indeed, so small is the pool of first-graders who make it to the end of the cycle that the large majority of those who do so—about two-thirds—go on to secondary education. Furthermore, because dropping out in primary education is the system's de facto selection mechanism, there are adverse implications regarding the quality of intake at subsequent levels. The high incidence of grade repetition exacerbates the problem, particularly because it encourages dropout without necessarily enhancing student learning. High dropout and high repetition combine to make Madagascar's system one of the most inefficient in terms of student flow among low-income countries. Supply-side interventions—ensuring that children in all localities have access to the full five grades of primary schooling and substantially reducing grade repetition—can make a difference and should obviously be considered as options for addressing the problem. Even with these interventions, however, there remains significant room for improvement. The challenge is to put in place mechanisms to test and evaluate additional approaches, particularly those that address demand-side constraints, to improve children's schooling careers.

Notes

1. The decline in higher education enrollments in traditional institutions was the result of a successful government effort to restore discipline in a subsector that had by the late 1980s become grossly mismanaged, with chronic repetition among students who stayed on beyond the usual duration of courses for which they were registered in order to take advantage of highly subsidized student housing and other welfare services.

2. The larger shares at the secondary levels compared with the share at the primary level are consistent with international patterns presented in James (1993).

3. According to data made available by representatives of private schools to the World Bank mission in connection with this study, in 2000 the shares of Catholic schools among all private schools were as follows: two-thirds of preschools and primary schools, half of the lower secondary schools, about one-third of the general upper secondary schools, and all of the *lycées techniques*. The main organizations delivering private education services include the following (their acronyms—which sometimes correspond to their names in Malagasy—are indicated in parentheses): Direction Nationale des Ecoles Catholiques (DINEC); Direction Nationale des Ecoles des Eglises de Jesus Christ à Madagascar (FJKM); Direction Nationale des Ecoles des Eglises Lutheriens de Madagascar (FLM); Direction des Ecoles des Adventistes; Direction National des Ecoles Anglicans; Eglises de Reveil de Madagascar (FFSM); Délégation National de l'Enseignement Libre de Madagascar (DNELM); and Direction Nationale des Ecoles Privées de Madagascar (DNEPM).

4. The relevant age groups in Madagascar are 6–10 for primary education, 11–16 for secondary education, and 17–23 for higher education.

5. Inaccuracies in the population data are another source of possible problems in computing the gross enrollment ratio. Calculation of Madagascar's gross enrollment ratios relies on data from the country's two most recent population censuses, in 1975 and 1993. For noncensus years the data consist of projections and extrapolations. The very high ratios computed for 1980 and 1985, for example, may be a reflection of underlying inaccuracies in the population projections for these years.

6. Because of these problems, gross enrollment ratios are often complemented by net enrollment ratios. The latter are computed as the number of students in the relevant age range for the given level of education divided by the population in the corresponding age group. Unfortunately, the net enrollment ratio does not offer a useful solution to the problems associated with dropout and grade repetition: it is still an average across all grades in a cycle of schooling, and it excludes from the numerator nonrepeaters who happen to enroll earlier or later than the official starting age for the cycle. Late enrollment is particularly common in many low-income countries.

7. As a check on the calculations for the primary cycle, we relate the number of nonrepeaters in grade 5 in 1998 to those in grade 1 in the same year, as well as to those in grade 1 about 7 years ago (when the current fifth graders would be entering school, after taking into account the impact of grade repetition on the average duration of primary schooling). The first calculation produces a ratio of 0.25, which is expectedly smaller than the cohort survival ratio of 0.33 reported in Table 2.5 because of increases in cohort size over time. The second calculation yields a ratio ranging from 0.33 to 0.35, which is very close to the result for the pseudo cohort reported in the table.

8. An alternative is to relate the number of nonrepeaters in grade 1 to the population in the corresponding age group for the nonrepeating first-graders. This method is applicable when reliable population data are available by single years of age.

9. Some never-enrolled children may eventually enroll at a later age. The lower bound of the age bracket was chosen to

minimize the number of children counted as not attending school because their entry into school was delayed. The upper bound was chosen (a) to ensure that cell sizes are sufficiently large and (b) to minimize the influence of behavior patterns in older cohorts in the estimation; these criteria conflict to some degree.

10. As data presented in subsequent chapters will show, the slow deterioration and stagnation of the education system since the early 1980s has resulted in a perverse pattern in the work force: younger workers are less well educated than older workers. Given the current pattern of student flow, it is clear that future cohorts will continue to enter the labor force with limited years of formal education.

11. The high end-of-cycle rates of repetition may seem inconsistent with the high rates of intercycle transition reported in the previous section. The contradiction is only apparent, however, because the transition rates refer to student flow in a cohort, whereas the repetition rates refer to a cross-sectional phenomenon.

12. In Figure 2.2, Madagascar is in a slightly better position than is suggested by its efficiency index of 0.37. Its placement is consistent with the slightly higher estimate of 0.42 reported in Mingat and Suchaut (2000). Whichever figure is used, Madagascar remains near the bottom of the sample of countries.

13. It is important to emphasize that considerations of external efficiency are important in guiding the expansion of opportunities in postprimary education. This subject is examined in greater detail in Chapter 8.

14. The link is nonetheless tenuous, given that the coefficient on the variable is statistically significant only at the 10 percent level.

15. See Madagascar (1995a, 1995b, 1996).

16. The calculations were performed using *fokotanys* rather than individual schools as the unit of observation to allow for the possibility of travel within a neighborhood to obtain access to a complete cycle of schooling. This produces a lower-bound estimate on the extent of the supply constraint. If the computation were performed with individual schools as the unit of observation, the corresponding percentage of new first-graders without access to a complete cycle of schooling would rise to 27.8 percent.

3

Education Finance

Public spending on education as a share of GDP is smaller in Madagascar than in most other low-income African countries. If additional public resources should flow to the sector, as appears likely with the anticipated reduction in the country's external debt service burden under the HIPC Initiative, how can the extra funds be used most effectively to advance sector development and ensure access to services by the poor? To evaluate that question, we need first to understand how the resources already available to the system are being used. This chapter reviews the following aspects of education finance in Madagascar: levels and trends in public spending across subsectors; the volume of private spending on education; the functional distribution of spending and its division between core and support components of service delivery; and the pattern of spending per student across levels of education.

Madagascar's education system is just emerging from a decade of heavy underfunding, with public spending only now recovering to about 3 percent of GDP, the level at the start of the 1990s. Remarkably, during the lean years aggregate spending shifted away from higher education toward the lower levels. The shift, however, appears not to have been any real benefit to primary education, and households continue to bear a substantial burden for financing services at this level, including services provided through public schools in rural communities. More can probably be done to restructure public spending per student across levels of schooling in favor of primary education. There is also scope for aligning the functional allocation of spending—throughout the system, but particularly at postprimary levels—to ensure that resources are available to support effective teaching and learning at the school level.

National Spending on Education

In Madagascar, as in most other countries, the government is the single most important source of funding for education, but households' contribution is also significant. Two features of the system account for the importance of household funding: private education, which relies largely on fees to cover operating costs, is relatively well developed; and fees and other contributions are collected in public as well as private schools.[1]

Spending by the government

Madagascar's budget for 2000 projects aggregate spending (in 1998 prices) at 698.5 billion Malagasy francs (FMG), about 21 percent higher than in 1990 (Table 3.1). A closer look at the increase shows that it is entirely accounted for by the growth in capital spending.[2] This sharp increase is consistent with the generally more volatile nature of capital spending and is mirrored in reverse by the downturn in spending in mid-decade. At the low point, in 1995, total spending was 56 percent of the 1990 level, but capital spending was only 15 percent as

Table 3.1
Levels and Trends in Public Spending on Education, Madagascar, 1990–2000

	All levels of education						Primary and secondary education, index			Higher education, index		
	Billions of 1998 FMG			Index (1990 = 100)			(1990 = 100)[a]			(1990 = 100)		
Year	Current	Capital	Total	Current	Capital	Total	Current	Capital	Total	Current	Capital	Total
1990	494.9	81.7	576.6	100	100	100	100	100	100	100	100	100
1991	469.2	83.5	552.7	95	102	96	99	114	100	84	92	86
1992	425.4	74.8	500.2	86	92	87	93	133	97	67	56	65
1993	429.1	46.8	475.9	87	57	83	92	95	93	72	25	61
1994	357.6	33.1	390.7	72	41	68	80	62	78	52	22	45
1995	311.9	12.1	324.0	63	15	56	72	26	68	39	5	31
1996	321.4	52.6	374.0	65	64	65	76	132	81	37	7	30
1997	375.5	85.7	461.2	76	105	80	90	192	100	39	31	37
1998	426.5	95.2	521.6	86	116	90	102	222	113	47	27	42
1999	473.4	141.1	614.5	96	173	107	114	293	131	50	71	55
2000	496.6	201.9	698.5	100	247	121	116	514	154	59	22	50

Note: FMG, Malagasy francs.
a. Includes spending on vocational and technical education, for which separate figures are available only after 1997, when the Ministère de l'Enseignement Technique et Formation Professionnelle (METFP) was created as a separate ministry from the MINESEB.
Source: Madagascar, various budget documents, as follows: for 1990–92, Madagascar (various years, a); for 1993–96, Madagascar (various years, b); for 1997–2000, Madagascar (various years, c). For the GDP deflator used to convert spending from current to 1998 FMG, World Bank SIMA database. For the underlying data on spending levels and trends, see Appendix table A3.1.

high. The corresponding figure for current spending was 63 percent.

The available data permit a breakdown of spending into two broad categories: (a) primary and secondary education (including vocational and technical education) and (b) higher education. These categories show a remarkable trend: whereas public spending on primary and secondary education in 2000 was 54 percent higher in real terms than in 1990, spending on higher education was 50 percent lower. At no time during the 1990s did spending on primary and secondary education fall below two-thirds of the 1990 level, whereas spending on higher education actually dipped below one-third of the 1990 level. As expected, capital spending in both sectors was consistently more volatile than current spending.

These trends in spending imply a major shift in budget allocations to subsectors (Table 3.2). In 1990 higher education accounted for 32 percent of total public spending on education, but in the 2000 budget its share had shrunk to 13 percent. The clear reorientation of spending in favor of the lower levels of education is the culmination of deliberate policies that were successfully implemented during the 1990s to tighten university enrollments and to reduce public spending on student financial aid and welfare services in higher education.[3]

It is not possible to assess, on the basis of the information in budget documents, to what degree the shift in spending toward the lower levels has benefited primary education in relation to secondary education. However, because the wages of teachers and other school personnel make up the bulk of spending at these levels of education, an inference can be drawn from trends in the numbers of staff working in public primary and secondary schools. At the primary level the number of staff,

Table 3.2
Distribution of Public Spending on Education by Level, Madagascar, 1990–2000
(percent)

Year	Total spending		Current spending		Capital spending	
	Share of primary and secondary education[a]	Share of higher education	Share of primary and secondary education[a]	Share of higher education	Share of primary and secondary education[a]	Share of higher education
1990	68.2	31.8	71.9	28.1	45.8	54.2
1991	71.4	28.6	75.0	25.0	50.9	49.1
1992	76.3	23.7	78.0	22.0	66.6	33.4
1993	76.5	23.5	76.6	23.4	75.9	24.1
1994	78.8	21.2	79.6	20.4	70.1	29.9
1995	82.5	17.5	82.6	17.4	80.1	19.9
1996	85.3	14.7	83.8	16.2	94.3	5.7
1997	85.2 (78.6)	14.8	85.4 (81.3)	14.6	83.9 (66.6)	16.1
1998	85.2 (80.5)	14.8	84.8 (80.7)	15.2	87.3 (79.2)	12.7
1999	83.6 (77.8)	16.4	85.3 (80.9)	14.7	77.7 (67.3)	22.3
2000	86.8 (78.4)	13.2	83.4 (77.9)	16.6	95.3 (79.7)	4.7

a. Separate figures for primary and secondary education are not reported in government budget documents. Before 1997 the data for those levels include spending on vocational and technical education. For 1997 and later years the percentage share of primary and secondary education only is shown in parentheses.
Source: Same as for Table 3.1.

which was 36,105 in 1991, fell throughout the decade. Even after two rounds of teacher recruitment in 1997–98 and 1999–2000, the number of staff in 2000 remains 5 percent below that at the start of the decade (see Appendix table A3.2).[4] In secondary education the absolute number of teachers was historically much smaller, totaling only 9,116 at the lower secondary level and 2,497 at the upper secondary level in 1991. Over the decade the number of teaching staff at these secondary levels expanded significantly, by 22 percent between 1991 and 2000 at the lower secondary level and by 63 percent at the upper secondary level. Given that enrollments for primary school rose by 34 percent between 1991 and 2000 but fell slightly at the other two levels, these trends in staffing provide indirect but clear evidence that primary education has not benefited much, if at all, from the shift during the 1990s in aggregate spending from higher education toward the lower levels of education.

As a final note on aggregate public spending on education, it is important to note the magnitude of donor funding. According to data on *crédits d'engagements* (expenditure commitments), which were available for the purpose of this study in a consistent series only for 1997, 1999, and 2000, external loans financed an average of 70 percent of total investment during the three years, while grants financed 25 percent and domestic sources financed the remaining 5 percent. The extraordinary share of external funding in the development budget underlines the potential contribution of donors to the direction of sector development. The recent surge in capital spending bears careful monitoring to ensure that donor funding is indeed directed toward supporting a sustainable expansion of the system, with

measures to improve physical infrastructure as well as the way schools function.

Spending by households

The government's investment in education is complemented to a significant degree by household spending (Table 3.3).[5] Netting out government grants to students to avoid double counting, total household spending (spending across all levels of education in both public and private schools) amounted to FMG 194 billion in 1997, or about 1.07 percent of GDP, which implies a household share of 36 percent in national current spending on education.[6] Adding this amount to the government's current and capital expenditure of 2.3 percent of GDP in 1997 brings the aggregate national investment in education to about 3.3 percent of GDP. These results demonstrate that households do indeed shoulder directly a significant share of Madagascar's investment in education.

Table 3.3
Household Spending on Education, Madagascar, 1997

	Total	Net of government grants[a]
Itemized household spendin (billions of current FMG)		
Fees	98.7	
School uniforms	21.6	
Books and school stationery	68.7	
Other	14.2	
Aggregate household spending (billions of current FMG)		
All levels of education	203.2	193.8
Primary education	97.6	97.6
Total household spending as a percentage of:		
GDP		1.07
National current spending on education[b]		36
Memorandum: Share of primar education in total household spending on education (percent)		50

a. Government grants amounted to FMG 9.5 billion in 1997 and benefited only students in postprimary education.
b. National current spending refers to the sum of household spending reported here and current government spending on education reported in Table 3.1 for 1997 (with all amounts adjusted to the same currency units). Note that government spending includes external funding channeled through the government.
Source: Total spending of households estimated from data from 1997 *Enquête Prioritaire auprès des Ménages*, with sample households' reported spending weighted by the relevant sampling weights to obtain aggregate spending for the country; data on government grants extracted from data supplied by the MINESEB and the MINESUP.

Overall, school fees of various kinds claim almost 50 percent of all household education spending, books and pedagogical supplies take another 34 percent, and uniforms and other unspecified items account for the remaining 17 percent. The available data allow only a two-category breakdown by level of education, between primary education and all other levels.[7] These data show that primary education, which enrolls 80 percent of all students, accounts for about 50 percent of total household spending on education. Because parents also make in-kind contributions of materials and labor, particularly for construction and rehabilitation of primary schools, the actual share may very well be higher.[8]

Data for 1999 from other sources allow a closer look at spending by households at the primary level (Table 3.4). Households spent a total of FMG 156 billion that year, while the government spent FMG 236.3 billion. Households thus account for about 40 percent of total national spending on primary education.[9] This share is much higher than the shares reported (for spending on primary and secondary education combined) for three developing countries for which data are available for the mid- to late 1990s: India (2 percent), Jordan (2 percent), and Malaysia (4 percent). It is comparable to the reported share of 38 percent for Kenya.

Fully a third of total household spending on education is spent on *public* primary schools, 87 percent of which serve rural populations.[10] Although the available data are not itemized, fees almost certainly claim a nonnegligible share of household spending on public schools, since they are the main source of funds that the parents' association (FRAM) of a school depends on to hire teachers on its own account to fill staffing gaps that result from an inadequate allocation of government-paid teachers. With regard to spending by the government, given the precarious fiscal situation in public schools it is not surprising that the bulk of the government's spending is directed to these schools.

Table 3.4
Government and Household Spending on Public and Private Primary Education, Madagascar, 1999

School type	Amount of spending (billions of current FMG)			Distribution of spending by source (percent)			Household spending as a share of national spending (percent)[c]
	Households[a]	Government[b]	Both sources	Households	Government	Both sources	
Public	51.6	233.9	285.5	33	99	73	18
Private	104.4	2.4	106.8	67	1	27	98
Both	156.0	236.3	392.3	100	100	100	40

a. Estimated from data on aggregate enrollments in each school type in 1999 and data from a European Union–funded 1999 survey on household spending per child, as reported in Madagascar (1999c). The estimates are comparable to those reported in Table 3.3 that were based on the 1997 *Enquête Prioritaire auprès des Ménages*: multiplying per-pupil spending from that survey (appropriately updated to 1999 prices using the relevant consumer price indices) by the total number of primary pupils in 1999 gives aggregate household spending of FMG 125.7 billion (81 percent of the FMG 156 billion in the table). This can be considered a small difference, given the differences in survey methods and sampling procedures.
b. Government spending on public primary schools includes overhead as well as school-level expenditures and is computed from unpublished data supplied by the MINESEB. It includes the salaries of physical fitness teachers paid under the Ministère de la Jeunesse et du Sport (MJS). Estimates of government spending on primary education in private schools (which often are multicycle schools) are based on unpublished data supplied by the MINESEB's Office National de l'Enseignement Privé (ONEP), apportioned to primary-level instruction according to the share of pupils at this level.
c. National spending refers to the sum of government and household spending.
Source: See notes a and b.

Only 1 percent of the total goes to private schools, in the form of subsidies to defray teacher salaries and other operating costs.[11]

Taking government and household spending together, the data suggest that 73 percent of the total goes to public schools, while the remaining 27 percent goes to private primary schools. The share of public schools is only slightly below the sector's share of total enrollments (78 percent), which may seem to imply that resource endowment per pupil is roughly comparable between the two sectors. Yet as measured by the availability of resources at the school level for teaching and learning activities, private schools are better endowed, with an estimated FMG 242,000 in spending per pupil, compared with only FMG 145,000, on average, in public schools. The difference arises because a significant share of government spending is absorbed by overhead, both at the central level and at the school level. The difference, moreover, is likely to be underestimated to the extent that private schools have other sources of funding besides households, including churches, secular bodies, and foreign nongovernmental organizations.

A Close-Up View of Public Spending on Education in 1998

We turn now to a closer examination of the allocation of public spending on education across subsectors and by function within each subsector, based on a detailed breakdown of actual spending in 1998, the latest year for which the relevant data are available. We approach the task by building up aggregate spending from the "underside," that is, by adding up the component parts of spending, beginning with a physical count of staff paid by the government to deliver education services.[12] Combining this data with information on salary scales (including benefits) and the distribution of staff by salary grade, we obtain estimates of the total wage bill. Adding the result to spending on nonsalary inputs yields the desired estimates of aggregate spending broken down by subsector and function. This approach provides an independent check on the amount of spending reported in budget documents, and it makes it possible to classify education expenditures under customized rubrics rather than those used in budget documents.

The functional distribution of government-paid staff in education

The three education subsectors together accounted for between 45 and 48 percent of all civilian government employees in Madagascar in the 1990s (see Appendix table A3.4). The Ministère de l'Enseignement Secondaire et de l'Education de Base (MINESEB) has the bulk of the employees. In 2000, for

example, 93 percent of the 59,523 personnel in education reported to the MINESEB, 4 percent to the Ministère de l'Enseignement Technique et Formation Professionnelle (METFP), and 3 percent to the Ministère de l'Enseignement Supérieur (MINESUP).

The distribution of staff across and within subsectors is shown in Table 3.5. Considering primary and secondary education as a whole, about 15 percent of MINESEB employees are in system administration, with nearly two-thirds of them concentrated at the district level. At the school level, about 13 percent of the staff is in administration or in pedagogical support functions. This average masks wide differences between primary and secondary education: whereas nonteaching staff make up about 7 percent of the personnel in primary schools, their share is 29 percent in lower secondary schools and 35 percent in upper secondary schools. The pre-

Table 3.5
Government Employees in the Education Sector, Madagascar, 1998

Distribution of education employees	MINESEB				METFP	MINESUP
		Secondary		Teacher	Vocational/	Higher
	Primary	Lower	Upper	training	technical	education
STAFF WORKING IN OWN MINISTRY						
In administration						
Central		1,014			258	152
Regional		1,988			169	0
District		4,860			0	0
Other		4			0	0
Subtotal		7,866			427	152
In schools/institutions of learning[a]						
Teaching	27,521	7,568	2,901	49	941	914
Nonteaching	2,137	3,009	1,525	84	838	3,770
Subtotal	29,658	10,577	4,426	133	1,779	4,684
In research or other institutions[b]		0			0	311
Total own-ministry staff		52,663[c]			2,206	1,377[d]
Staff assigned from other ministries[e]	0	288	63	0	0	0
TOTAL GOVERNMENT EMPLOYEES						
In the education sector		53,014[d]			2,206	5,147
In each ministry's budget vote		52,663			2,095	1,377

a. The numbers of teaching and nonteaching staff in primary and secondary schools are computed using the available data on total staff in schools, disaggregated by the distribution between the two categories based on the MINESEB 1997–98 school census.
b. Such institutions include, for example, Parc zoologique de Tsimbazaza, Centre des bourses extérieures, Agence nationale d'évaluation, Centre national de la langue Anglaise, Institut des services techniques et nucléaires, archeological museums, l'Observatoire et le laboratoire radio-isotope, la Maison de la communication universitaire, les Foyers des étudiants à l'Extérieur (at Arago and Cachan), province-level institutions such as the Cedratom de Tuléar, and so on.
c. Includes four staff members assigned to the Ecole Normale Supérieure, which actually comes under the purview of the MINESUP.
d. Excludes the 3,770 nonteaching personnel (*personnels administratifs et techniques*, or PATs) who are paid out of direct budget transfers to the universities and other higher education institutions.
e. Refers to the 351 physical education teachers paid under the budget of the Ministère de la Jeunesse et du Sport.
Source: Based on data supplied by the MINESEB, the METFP, the MINESUP, and the Ministère chargé du Budget et du Développement des Provinces Autonomes (MBDPA), supplemented by information for the MINESEB from the 1999 civil service census and from the 1997–98 school census and by information for the METPF from the 1999 *Audit des Etablissements de Formation Technique et Professionnelle*, a survey of vocational and technical education and training institutions.

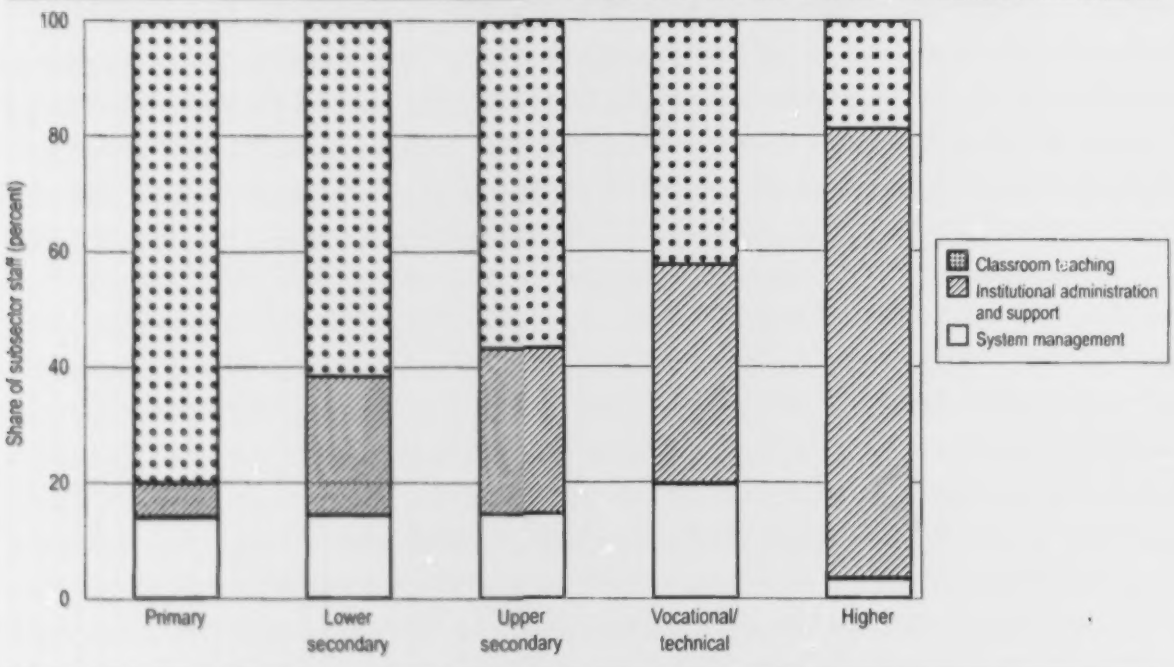
dominance of nonteaching staff is even greater, 47 percent, in vocational/technical education and reaches truly alarming proportions of 80 percent in higher education.

Figure 3.1 summarizes the functional distribution of staff in each subsector. The large number of nonteaching staff—both in the central administration and at the school or institution level—throughout the system, but especially in postprimary education, is striking and hints at a potential imbalance in the allocation of spending between front-line and support functions in the delivery of education services.

The cost of teachers and other government-paid staff in the education sector

To go from the distribution of staff to a more precise picture of the distribution of spending requires additional information on the pattern of staffing across salary grades. The data for teachers appear in Table 3.6. The bulk of the teachers are distributed across 10 salary grades, ranging from the lowest level, which requires only primary school completion as the initial level of training, to the highest, which requires a Ph.D. Two features of the data are noteworthy. The first is that the distribution of staffing is what one would expect in a low-income country, with most teachers, particularly those at the base of the system, concentrated in salary grades requiring educational qualifications that modestly exceed the level of teaching to which they are assigned. Thus, 93 percent of primary school teachers are in the salary grade that requires only a lower secondary school education as an initial qualification. At the lower secondary level 70 percent of the teachers are in the grade that requires only an upper secondary school education—and 14 percent have an initial level of training that is no higher than the level for which they are preparing their own students. In upper secondary education and in vocational training and technical education the distribution is more dispersed, and in higher education all teachers have the equivalent of at least a master's degree.

Figure 3.1
Staff Distribution by Function and Level of Education, Madagascar, 1998–99



Note: Assumes that staff in system management are apportioned in proportion to the shares of school-level staff at the various levels of schooling.
Source: Appendix table A3.7.

Table 3.6
Teacher Salaries and Distribution of Teachers by Salary Grade, Madagascar, 1998

Salary grade	Initial qualification required[a]	Average annual salary cost per staff member (thousands of 1998 FMG)[b]	Percentage distribution of teaching staff by salary category[c]					
			Primary	Secondary		Vocational/technical		Higher education
				Lower	Upper	CFP	LTP	
1	CEPE	4,021	2	0	0	0	0	0
2	BEPC	4,446	93	14	3	21	5	0
3	*Baccalauréat*	5,092	4	70	9	55	22	0
4	DEUG	6,029	0	7	9	9	10	0
5	*Licence*	7,055	0	3	22	11	19	0
6	*Maîtrise*	6,532	0	4	39	3	32	0
7	CAPEN (or equivalent)	6,258	0	1	17	1	7	0
8	DEA	18,370[d]	0	0	0	1	5	38
9	*Doctorat 3rd cycle*	19,256	0	0	0	0	0	46
10	*Doctorat d'état*	21,323	0	0	0	0	0	17
All grades[e]			100	100	100	100	100	100
Average wage (thousands of 1998 FMG)[f]			4,651	5,407	6,704	5,625	6,775	19,269

Note: BEPC, *brevet d'enseignement du premier cycle*; CAPEN, *certificat d'aptitude pédagogique pour l'enseignement*; CEPE, *certificat d'études primaires élémentaires*; CFP, *centre de formation professionnelle*; DEA, *diplôme d'études approfondies*; DEUG, *diplôme d'enseignement universitaire générale*; LTP, *lycée technique professionnelle*.

a. The qualifications correspond to the certificates at the end of the following levels of schooling: primary education for the CEPE; lower secondary education for the BEPC; upper secondary education for the *baccalauréat*; two, three, and four years, respectively, of higher education for the DEUG, the *licence*, and the *maîtrise*; preservice teacher training at the university level for the CAPEN; one year of study after the *maîtrise* for the DEA; and Ph.D.-level studies for the doctorat. Staff with preservice training will have more years of schooling than the number corresponding to the qualification indicated for each salary grade.

b. Reflects the full salary cost per staff member at each salary grade category, including basic salary, cash benefits (*primes*), and the government's share of pension contributions. The data for salary grades 1–7 are compiled from information on individual primary and secondary school teachers and their salary grades, matched against information on the salary scale. The pay of vocational and technical teachers (who represent only a very small share of all teachers) in these grades is higher by an average of about 10 percent. The data for grades 8–10 apply only to higher education teachers and are supplied directly by the MINESUP.

c. The distribution for primary and secondary education is from the MINESEB 1997–98 school census; that for vocational/technical education is from the 1999 *Audit des Etablissements de Formation Technique et Proffessionnelle*, and that for higher education is from electronic data files for 1997–98 supplied by the MINESUP.

d. Data in this cell apply only to teachers in higher education in salary grade 8; salary costs of vocational/technical teachers in category grade 8 averaged FMG 7.02 million in 1998.

e. Columns may not total 100 percent because of rounding.

f. Because of differences in the distribution of teachers by experience in each subsector, the average wage figures in this row are not exactly the same as the average annual salary cost per staff member in each salary grade weighted by the distribution of teachers by salary grade. The averages for vocational/technical education are based on average salaries of teachers in that subsector, which are higher than salaries for other teachers in the same salary grade.

Source: See notes b and c.

The second noteworthy feature in the table has to do with the progression in wages across salary grades.[13] Consider first the top end of the salary scale, which applies to teachers in higher education. A staff member in salary grade 8 would hold a DEA, which is obtained with just one more year of study after the *maîtrise*, yet he or she would earn about 2.5 times as much as civil servants holding the *maîtrise*. Part of the reason is that many staff members in salary grade 8 have stayed in the same grade for years and have accumulated salary increases as their experience rose. Even so, an increase of 250 percent in average wages between grades 7 and 8 is large. By comparison, wages increase by only 5 percent between salary grades 8 and 9 and by 10 percent between grades 9 and 10. The compressed structure of wages reflects the fact that cash benefits (such as those for housing and other entitlements for which

government teachers in higher education are eligible) are a large component of a teacher's pay, representing between 64 and 78 percent of the total wage. Thus, even though the basic salary of a top-paid teacher in higher education is about twice as high as that of the lowest-paid, the total salary cost differential between staff at these ends of the spectrum turns out to be relatively modest.

For teachers at other levels, the progression in wages is less abrupt; the rise is 16 percent between salary grades 1 and 2 and 22 percent between grades 2 and 3. Most of the staff in these three grades are either primary school or lower secondary school teachers. Comparison of their wages with those of other wage earners suggests that both the level of wages and the relative structure across grades is consistent with prevailing labor market conditions (see Box 3.1). For teachers in grades 4 to 7, the initial qualification is some type of first-degree university education. The structure of wages implies a return of between 10 and 12 percent a year per year of university study, which is comparable to the estimates for wage earners in general.

In addition to the teachers, about 19,808 government employees work as nonteaching staff in schools and various educational institutions, and 8,445 work as administrative staff at the central and decentralized levels of the education sector. As Table 3.7 shows, the distribution of the nonteaching staff by qualification is at first glance curious in that the share of *baccalauréat* holders in primary education (that is, those at salary grade 3) actually exceeds that in higher education. The underlying reason is that nonteaching staff in higher education include many service-level personnel who used to work in student services (such as cafeteria) that have now been privatized, whereas those in primary education include school administrators and teachers assigned to nonteaching duties. As for systemwide administrative staff (not shown in the table), most of these staff are in salary grades that require some level of university education.

Putting together a picture of the functional distribution of public spending

Combining the two sets of information presented above—the functional distribution of staff by level of education and by salary grade—allows us to estimate the distribution of the aggregate salary bill by level of education and by function within each level. Adding the result to data on nonsalary spending, we obtain a complete picture of the composition of public spending on education (Table 3.8).

Focusing first on the last two rows of Table 3.8, we note that the aggregate spending reported in budget documents for 1998 matches reasonably closely the itemized amounts built up from the bottom for each of the ministries: it exceeds the itemized sum by about 2 percent for the MINESEB and falls short of it by 4 percent for the METFP and by 6 percent for the MINESUP. The relatively modest gaps increase our confidence in the correspondence between reported spending and the broad operational characteristics of the education system.

Consider next the row "Subsector share of spending," where the data relate to the pattern in distribution of spending by level of education. They show that primary education claims about half of the government's aggregate spending on education, while the other subsectors claim shares ranging between 1 and 19 percent. Considering that more than 80 percent of all students in the system are enrolled in primary education, the share of this subsector appears low, providing a first hint of possible inequities in the pattern of education finance. For comparison, note that for all subsectors beyond primary schooling, the share of spending consistently exceeds the corresponding share of enrollments.

Table 3.9 presents data on what is perhaps of even greater interest: the functional distribution of recurrent spending within each subsector. Instead of replicating the relatively traditional categories listed above, the table shows a slightly different arrangement in order to highlight a new perspective on expenditure management issues in the sector. A distinction is made among three categories of spending: core business, core business support, and system overhead.

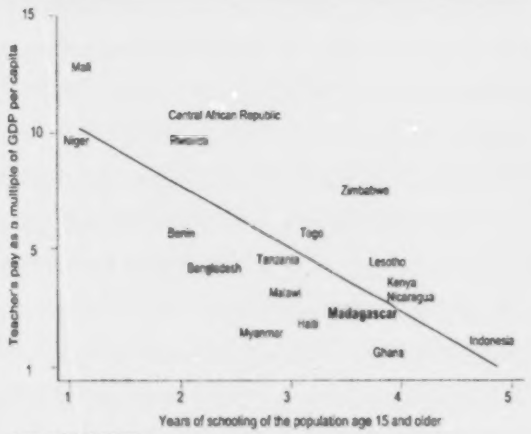
In education, particularly at the lower levels, there is essentially one core activity: teaching services. Spending on core business thus includes the cost of the teaching staff, as well as subsidies to private schools (on the grounds that the subsidies are a form of outsourcing for the core activity). In all schools, classroom teaching does not function in

Box 3.1
Comparative Perspectives on Teacher Salaries in Madagascar

Because teacher salaries account for the bulk of public spending on education, it is of interest to examine how teacher pay in Madagascar has evolved over time and how it compares with the pay of teachers in other countries and with that of other wage earners in Madagascar.

In the 1990s the take-home pay of public primary school teachers in Madagascar averaged 2.5 times per capita GDP, while the corresponding ratio at the secondary level was 3.2 (Box table 3.1). These ratios are lower than for teachers elsewhere in Sub-Saharan Africa but are largely consistent with what one would expect given the educational attainment of the adult population in Madagascar (Box figure 3.1). The pay of Malagasy teachers has improved over time in relation to GDP per worker, and at both the primary and the lower secondary levels it is at least as high as that of wage earners with similar educational attainment. The data suggest that the salaries of public school teachers are, on average, probably not seriously misaligned in the current market for educated labor.

Box figure 3.1
Relation between Primary School Teachers' Pay and the Educational Attainment of the Adult Population, Selected Countries, circa 1993



Source: ADEA (1998).

Box table 3.1
Public School Teachers' Annual Take-Home Pay, Madagascar and Sub-Saharan Africa, 1990s
(ratio)

	Teachers' pay/ GDP per capita		Teachers' pay/ GDP per worker		Teachers' pay/pay of wage earners in public and private sector employment, 1997[a]		
Level of education	1993	1998	1993	1997	Public	Private	Both sectors
Madagascar[b]							
Primary	2.42	2.53	1.07	1.33	0.99	0.98	0.98
Lower secondary	3.04	3.25			1.03	1.13	1.08
Upper secondary					—	—	—
Sub-Saharan Africa[c]							
Primary	6.58	—	—	—	—	—	—
Secondary	7.57	—	—	—	—	—	—

a. The comparison is based on wages for teachers and wage earners with similar levels of educational attainment.
b. Based on the 1997–98 school census, the 1997 Enquête Prioritaire auprès des Ménages, and electronic data files supplied by Service de la Solde, Institut National de la Statistique (INSTAT).
c. For primary education, based on data for 20 countries from ILO (1996), cited in Santosh and Buckland (1998); for secondary education, based on data for 23 countries from ADEA (1998).
Source: See notes b and c.

isolation but is supported by administrative and other school-level personnel (cleaners, janitors, laboratory assistants, and so on) and by material services and inputs (such as utilities, pedagogical supplies, textbooks, and teacher manuals), all of which facilitates and enhances what goes on in the classroom. Expenditure on these items can therefore be grouped under core business support. Taken together, the two categories of spending—core business, and core business support—represent what is spent to operate front-line service units (schools and other institutions of learning) that directly reach the education system's intended clients, that is, students and their parents.

Away from the front line, there is spending on business overhead, the most obvious component

Table 3.7
Distribution of School-Level Nonteaching Staff by Salary Grade, Madagascar, 1998

Salary grade	Average annual salary cost per staff, 1998 (thousands of 1998 FMG)[a]	Distribution of nonteaching staff by salary grade (percent)			
		Primary	Secondary	Vocational/ technical	Higher
Contractual	3,955	0	0	15	19
1	3,656	3	12	13	44
2	4,527	74	59	36	17
3	5,403	23	20	22	13
4 and above	6,903	0	10	14	7
All grades[b]		100	100	100	100
Average wage (thousands of 1998 FMG)[c]		4,556	5,075	5,080	4,315

Note: FMG, Malagasy francs.
a. The data refer to wages for nonteaching staff in primary and secondary education.
b. Columns may not total 100 percent because of rounding.
c. Because of underlying differences in distribution of staff by experience in each subsector, the average wage figures are not identical to the average annual salary costs weighted by the distribution of the staff by salary grade. Figures for vocational/technical education are based on salaries for nonteaching staff in this subsector, which differ somewhat from those for primary and secondary education. Because wages by salary grade for higher education are unavailable, the average for higher education is computed using the salary structure shown in the first column.
Source: See sources given in Table 3.6.

Table 3.8
Current Public Spending by Function, Ministry, and Level of Education, Madagascar, 1998
(millions of current FMG)

Spending category	MINESEB				METFP	MINESUP
		Secondary		Teacher training[a]	Vocational/ technical	Higher education
	Primary	Lower	Upper			
STAFF SALARIES AND BENEFITS						
System administration[b]	27,418	9,778	4,092	123	1,870	1,169
School-level administration and support[c]	9,600	15,140	8,203	403	4,027	19,405
Teaching	128,011	42,318	19,764	272	6,101	19,622[d]
Other	0	0	0	0	0	2,392[e]
Total staff salaries and benefits	165,029	67,237	32,059	797	11,998	42,588
NONSTAFF RECURRENT SPENDING[f]						
System administration[b]	25,338	9,036	3,781	114	3,622	3,586
Operating costs of public institutions[g]	23,181	2,797	1,561	1,608	1,794	10,409
Student financial aid	0	471	175	7	94	8,864[h]
Subsidies to private schools[i]	2,238	625	157	0	0	0
Grants to national organizations[j]	2,551	356	82	0	0	0

(Continued)

Table 3.8 *(continued)*

Spending category	MINESEB				METFP	MINESUP
		Secondary		Teacher training[a]	Vocational/ technical	Higher education
	Primary	Lower	Upper			
Other transfers	0	0	0	0	493[k]	3,323[l]
Total nonstaff recurrent spending	53,307	13,285	5,757	1,729	6,003	26,182
TOTAL RECURRENT SPENDING						
Sum of above components	218,337	80,521	37,816	2,526	18,001	68,770
Subsector share of spending (percent)[m]	51	19	9	1	4	16
Subsector share of enrollments (percent)[n]	83	12	3	0	2	1
Amount reported in budget documents			344,334		17,233	64,383
Amount reported in budget documents/total recurrent spending[o]			1.02		0.96	0.94

a. Includes only expenditures for level 1 of the Ecole Normale, the teacher training institute that prepares primary school teachers. The institution that prepares teachers for secondary schools, Ecole Normale Supérieure, comes under the purview of the MINESUP; four staff at this institution appear under the MINESEB's budget vote but are excluded here for the sake of consistency.
b. The available data for the MINESEB show an aggregate amount for all levels of education under the ministry. The amount is apportioned here according to the distribution of school-level staff in the system on the assumption that the breakdown corresponds to the cost of personnel management across levels of education. This approach is adopted in view of data constraints and ignores the possibility that some overhead items, such as that for examinations, should in fact be spread over all students in the system in both the public and private sectors.
c. Refers to the cost of staff engaged in school administration or pedagogical support tasks (e.g., laboratory technicians and other assistants).
d. Includes cost of overtime teaching *(heures complémentaires)* paid out of the budgets transferred to public universities.
e. Refers to salaries of staff associated with various national research and cultural institutions.
f. Data for the MINESEB were available only for 1999. The amount for 1998 was estimated by adjusting the 1999 data by an inflation rate of 9.3 percent between the two years. Note also that some categories may include the cost of temporary or contractual personnel.
g. Includes expenditures for utilities, office supplies, and other running costs.
h. Excludes student aid for students at level 1 of the Ecole Normale; includes student aid for all other students, including those studying abroad.
i. The available data show an aggregate amount that is apportioned here by level according to the distribution of private school students enrolled in the various cycles. This procedure appears appropriate given that most private schools offer instruction that typically spans more than one cycle of schooling.
j. Refers to transfers to such organizations as the UNESCO National Commission and the Institut National de la Formation Pédagogique. The aggregate amount is apportioned according to the distribution of students, which seems appropriate given that the services of these institutions eventually benefit students in the system.
k. Reflects the residual after subtracting the amount for student aid from the amount reported as transfers in budget documents.
l. Refers to nonstaff spending in research and cultural institutions that is charged to the MINESUP.
m. Refers to the distribution of total recurrent spending on education across all levels.
n. Refers to the distribution of enrollments by level and type of education, including enrollments in both public and private schools (except in higher education, where the data refer only to enrollments in the public sector).
o. Refers to the ratio of the amounts reported in budget documents to the corresponding aggregates in the row "Sum of above components."
Source: Authors' estimates based on data on staffing and civil service pay structures and on itemized data on nonstaff spending supplied by the MINESEB,the METFP, and the MINESUP.

being overall system administration and management in the central ministry as well as in regional offices at the provincial and district levels—respectively, the Direction de l'Enseignement Secondaire et de l'Education de Base (DIRESEB) and the Circonscription Scolaire (CISCO). For the MINESEB, the overheads are distributed across primary, lower secondary, and upper secondary education in proportion to the staff distribution across these levels of education, on the assumption that most of the costs are incurred for personnel management.[14] Another overhead is student financial aid, which, to continue with the business analogy, can be viewed as a form of customer rebate, since it achieves the same effect of reducing the cost of consumption to the client. Finally, just as a business would spend on research and development, grants and transfers to national research and other organizations could be categorized under this rubric.[15] The distribution of spending across the three main categories is summarized in Figure 3.2. The main thing to notice here is that in higher education the share of spending on local administration and support is not as dominant as the distribution of

Table 3.9
Distribution of Current Public Spending on Education by Business Category, Madagascar, 1998
(percent)

Spending category	Primary	Lower secondary	Upper secondary	Vocational/ technical	Higher
AT THE SCHOOL LEVEL					
Core business					
Teaching services in public schools	58.6	52.6	52.3	33.9	28.5
Subsidies to private schools	1.0	0.8	0.4	0.0	0.0
Total core business	59.7	53.3	52.7	33.9	28.5
Core business support					
School-level material inputs	10.6	3.5	4.1	10.0	15.1
Local administration and support	4.4	18.8	21.7	22.4	28.2
Total core business support	15.0	22.3	25.8	32.3	43.4
AT THE SYSTEM LEVEL					
Overhead					
System management	24.2	23.4	20.8	30.5	6.9
Student financial aid	0.0	0.6	0.5	0.5	12.9
Other transfers[a]	1.2	0.4	0.2	2.7	8.3
Total overhead	25.3	24.4	21.5	33.8	28.1
TOTAL SPENDING	100.0	100.0	100.0	100.0	100.0

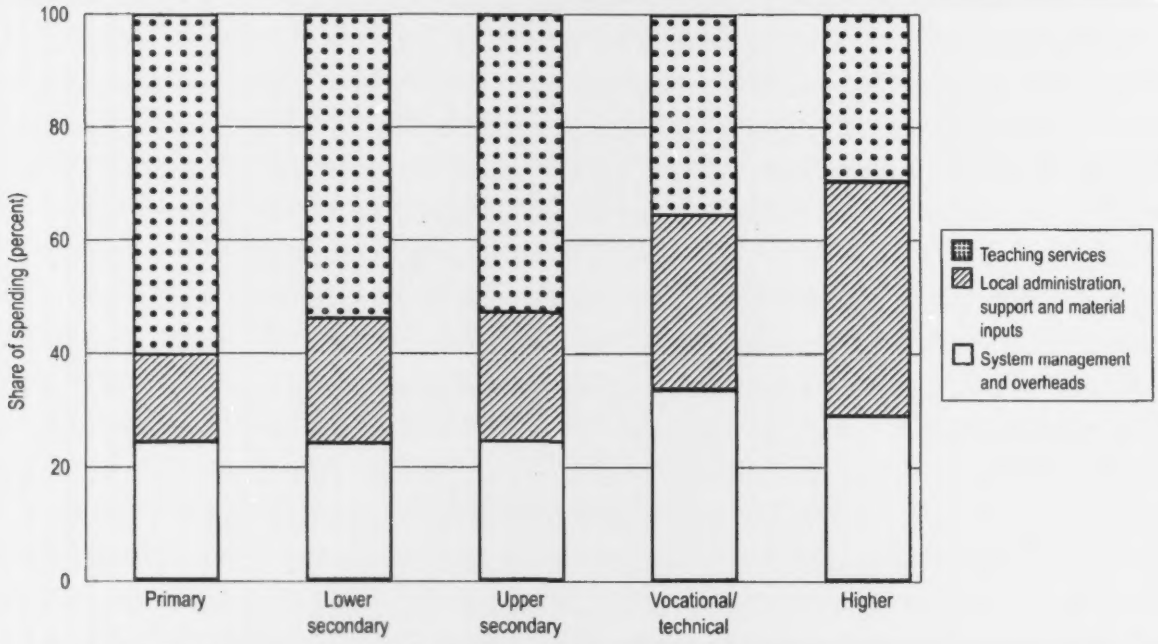
a. Refers to transfers to national research and other organizations.
Source: Authors' calculations based on Table 3.8; see text discussion for definitions of items.

staffing in Figure 3.1, above, would suggest. The result is closely associated with the fact that the large majority of administrative staff in the public universities consists of employees in the lowest salary grades.

In looking at the pattern of expenditure presented above, it is important to acknowledge at the outset that there is no obvious benchmark against which to judge the distribution of spending, not least because there are limits to how far the business analogy remains relevant when applied to a public service sector such as education. Yet when substantial shares of spending fall outside the core business of classroom teaching, it is reasonable to wonder whether resources are sufficiently focused on delivering services that would satisfy the expectations of students and their parents, who effectively make up the system's clientele.

The data in Table 3.9 show that throughout the system, combined spending on core business and core business support absorbs between two-thirds and three-quarters of total spending. There are striking differences, however, in the allocation between the two components by level: whereas the share of core business is about 60 percent in primary education, it falls steadily with rising levels of education, dropping to only 29 percent in higher education. Correspondingly, the share of local support services rises with level of education, from 15 percent in primary education, to just under 25 percent in secondary education, to 32 percent in vocational/technical education, to 43 percent in higher

Figure 3.2
Distribution of Curent Public Spending on Education by Function and Level, Madagascar, 1998



Note: Assumes that staff in system management are apportioned in proportion to the shares of school-level staff at the various levels of schooling.
Source: Authors' calculations based on Table 3.8; see text discussion for definitions of items.

education. Except in primary education, most of the spending on local-level support is for staff rather than material inputs. Although it is beyond the scope of this report to offer a definitive judgment on the efficacy of these spending allocations, the fact that so few resources reach the classroom does suggest a need to reexamine how resources are used on the front line.[16]

Consider next the share of spending on overhead, which absorbs about 22–34 percent of total spending. The bulk of this expenditure is directed at system administration and management in all subsectors except higher education, where its small share—about 7 percent, compared with shares elsewhere in the system ranging between 21 and 31 percent—is undoubtedly linked to the fact that public universities operate as autonomous institutions with their own administrative staffs. Because there are fixed costs to running a system, the somewhat high proportion of spending on overhead may be unavoidable in a country with a modest overall level of public spending on education. At the same time, it would be wise to view the pattern as signaling a need to scrutinize future expenditure decisions carefully to avoid perpetuation of a top-heavy allocation of spending. Given the importance of personnel costs in spending, this essentially implies careful assessment of staffing decisions for overall system administration and management.

Finally, it is important to note that spending on student financial aid in higher education absorbs about 13 percent of total spending. While subsidies for graduate studies may be valid on grounds of externalities, those for undergraduate studies are less valid because (a) most of the benefits are captured privately, (b) most students come from better-off families, and (c) the demand for higher education is strong, as indicated by the high rates of repetition in the terminal grade of upper secondary education documented in the previous chapter. Taken together, these considerations raise questions about current

policy on student finance, especially in a context in which the material inputs to support teaching services receive a share of total spending that only slightly exceeds the share claimed by student financial aid.

Levels and Patterns of Public Spending Per Student

What does the aggregate spending documented above imply for the pattern of public spending per student by level of education? How do the results for Madagascar compare with those for other countries? What factors account for the differences in unit spending across levels and types of schooling? The discussion below explores these issues.

Comparisons across levels of education in Madagascar

As Table 3.10 shows, spending per student spans a wide range, from FMG 147,000 per primary pupil in 1998 prices to FMG 11.54 million per student enrolled in preservice primary teacher training. (The extremely high figure for the latter activity reflects exceptionally small enrollments in recent years.) At the other levels, the structure of spending rises, as expected, with level of education: general lower secondary education is about 4 times as costly as primary schooling, general upper secondary education is 8 times as costly, vocational and technical training is about 12 times as costly, and higher education is about 17 times as costly. The wide differences between levels are traceable mainly to differences in staffing within each subsector. In addition to the disparities across levels and types of education, differences in public spending per pupil also exist within each subsector and across localities and type of service—for example, in vocational and technical education between the *lycées techniques professionnels* and the *centres de formation professionnelle*, and in higher education between the highly selective *instituts superieurs de technologie* and the open-access Centre National de Télé-Enseignement de Madagascar, the distance-learning system.

It should be emphasized that the above data merely represent annual public spending per student in each cycle. Because of dropout and grade repetition—which, as noted in Chapter 2, are much more prevalent in Madagascar than in other low-income countries, especially at the primary level—average spending for each graduate from a cycle of schooling would obviously be greater than total annual spending per pupil aggregated over the duration of the cycle. As has been shown, the

Table 3.10
Public Spending Per Student by Level of Education in the Public Sector, Madagascar, 1998

Level of education	Public sector enrollments, 1997–98	Total public spending (millions of current FMG)[a]	Spending per student	
			Current FMG	As ratio of spending in primary education
Primary	1,468,211	216,099	147,200	1.0
Lower secondary	145,652	79,896	548,500	3.7
Upper secondary	31,425	37,659	1,198,400	8.1
Vocational/technical	10,151	18,001	1,773,300	12.0
Teacher training[b]	219	2,526	11,536,000	77.6
Higher[c]	27,801	68,770	2,473,700	16.6

a. Includes all overhead except subsidies to private schools.
b. Refers to costs in level 1 of the Ecole Normale, which trains primary school teachers.
c. Includes enrollments and spending in regular public universities, the *instituts supérieurs de technologie* (IST), and the Centre National de Télé-Enseignement de Madagascar (CNTEMAD), the country's distance learning system. Spending includes overhead for overall system administration and management and for student financial aid.
Source: For enrollments, data files supplied by the MINESEB, the MINESUP, and the METFP; for spending, Table 3.8.

system currently operates with a student flow efficiency of only 0.37 in the primary cycle, 0.69 in the lower secondary cycle, and 0.74 in the upper secondary cycle. The implied annual waste of resources—in the sense that resources are spent without producing the expected graduates at the end of each cycle of schooling—amounts to an estimated FMG 101 billion in primary education, FMG 19 billion in lower secondary education, and FMG 8 billion in upper secondary education, for a grand total for the three cycles of FMG 127 billion (US$23 million), or about 38 percent of the MINESEB's overall budget for 1998.[17]

Cross-country comparison of spending per student

Table 3.11 presents comparative data on unit spending as a percentage of per capita GNP. Because the international data refer to spending per student regardless of sector of enrollment, the data for Madagascar are adjusted accordingly.[18] For secondary education the data for Madagascar refer to the average of the lower and upper cycles weighted by their enrollment shares.

In primary education Madagascar's figure is closer to the levels in low-income and lower-middle-income countries in Asia and Latin America than to the levels in Sub-Saharan African countries. The similarity stops there, however. As the last two columns in Table 3.11 show, unit spending in secondary education in relation to primary education is higher in Madagascar than in the three non-African regions and is comparable to the level in francophone Africa. In higher education, spending per student relative to primary education is again higher in Madagascar than in any of the non-African regions—a multiple of more than 19, compared with multiples of approximately 8 to 11. Although the gap is not as skewed in favor of higher education as in other African countries, the difference remains substantial and inevitably produces inequities in the incidence of public spending on education.

Table 3.11
Current Public Spending Per Student, Madagascar and Developing Regions, 1990s

Country or region	Number of countries	Public spending as a multiple of per capita GNP			Public spending as a multiple of spending in primary education[a]	
		Primary	Secondary	Higher[b]	Secondary	Higher[b]
Madagascar, 1998[c]	1					
Public spending per student		0.08	0.26	1.57	3.2	19.6
Public spending per student in public institutions		0.11	0.47	2.04	4.3	18.5
Regional averages, 1990s[a]						
Francophone Africa	15	0.15	0.49	5.6	3.3	37.3
Anglophone Africa	9	0.10	0.66	6.3	6.6	63.0
Latin America and the Caribbean	10	0.07	0.11	0.7	1.6	10.0
Asia	8	0.08	0.19	0.9	2.4	11.3
Middle East and North Africa	6	0.11	0.30	0.9	2.7	8.2

a. Averages are based only on data for countries with per capita GNP below $1,000 in 1993.
b. For higher education, refers to per-student spending in traditional public institutions.
c. Two sets of figures are shown for Madagascar: the first row refers to current spending averaged across all students at each level regardless of whether they are in public or private schools and regardless of type of institution; the second row refers to current spending averaged across only students in public schools.
Source: For Madagascar, Table 3.10; for regional data, Mingat and Suchaut (2000).

Components of public spending per student in the public sector

To help clarify the underlying sources of differences in unit spending across levels or types of schooling, we can decompose the estimates of overall unit spending per student into their component parts simply by dividing aggregate spending on each item of spending by the number of students:

$$US = \frac{\Sigma_i TS_i}{P}$$

where US is overall unit spending, TS_i is total spending on component i, and P is the number of public sector students. Unit spending on the salaries of teachers and nonteaching staff can be expressed as a function of two items, the average salary cost of these staff, and the corresponding pupil-staff ratios, as follows:

$$USS = \frac{TSS}{P} = \frac{ASS \cdot NS}{P} = ASS \cdot 1/(P/NS) = \frac{ASS}{PSR}$$

where USS is unit spending on staff salaries, TSS is total spending on staff salaries, ASS is the average salary cost per staff, NS is the number of staff, and PSR is the pupil-to-staff ratio. The second equation makes it possible to compare differences in unit spending across levels or types of schooling in terms of the underlying differences in level of salaries per staff and the pupil-staff ratio (which may be interpreted as a proxy of the intensity with which staff are used). As an added bonus, the decomposition of unit spending into its component parts also provides a basis for simulating the impact of potential changes in policies affecting arrangements for service delivery.

To illustrate, consider the results in Table 3.12 for primary, secondary, and vocational/technical education.[19] Overall unit spending per upper secondary student, for example, is 8.1 times as high as spending per primary school pupil, but for spending per student on nonteaching staff services, the ratio is almost 38 percent. For vocational/technical

Table 3.12
Decomposition of Public Spending Per Student in Public Schools, Madagascar, 1998
(thousands of current FMG, unless otherwise indicated)

	Spending per student				Index relative to spending on primary education[a]			
		Secondary		Vocational/		Secondary		Vocational/
Unit spending by component	Primary	Lower	Upper	technical	Primary	Lower	Upper	technical
Teacher salaries	87.3	292.3	632.5	600.8	1.0	3.3	7.2	6.9
Average annual teacher salary[b]	4,651	5,407	6,704	6,489	1.0	1.2	1.4	1.4
Student-teacher ratio	53.3	18.5	10.6	10.8	1.0	2.9	5.0	4.9
Nonteaching staff salaries	6.6	102.7	251.4	419.8	1.0	15.5	37.9	63.3
Average annual nonteacher salary[b]	4,556	4,970	5,179	5,080	1.0	1.1	1.1	1.1
Student-nonteacher ratio	687.0	48.4	20.6	12.1	1.0	14.2	33.3	56.8
School-level material inputs	15.8	19.2	49.7	176.7	1.0	1.2	3.1	11.2
Student financial aid	0.0	3.2	5.6	9.3	..	1.0	1.8	2.9
Overhead	37.7	131.6	253.1	589.6	1.0	3.5	6.7	15.6
All components	147.4	549.0	1,192.3	1,796.3	1.0	3.7	8.1	12.2

.. Not applicable.
a. The index expresses the unit spending in the previous columns relative to the corresponding figure for primary education. For the ratio of students to staff, the ratio is inverted to reflect the fact that smaller ratios correspond to higher levels of unit spending. The ratios are based on counts of staff in the 1999 civil service census.
b. Total cost of personnel to the government, including the government's contribution to social security.
Source: Constructed from data in Tables 3.5–3.8 and 3.10.

education, the overall ratio is about 12, but the ratio for spending per student on nonteaching staff is 63 and that for overhead is 16, highlighting the particularly generous provision of these components. Looking more closely at the results, we see that average salaries of nonteaching staff in upper secondary and vocational/technical education are only about 10 percent higher than what similar staff in primary schools receive but that the ratio of students to staff is, respectively, 33 and 57 times more favorable than in primary schools. The lower student-staff ratios are thus far and away the most important reason for the elevated spending per student on nonteaching personnel in upper secondary and vocational/technical education.

As documented earlier, teachers' compensation is the main component of education costs, particularly in primary, lower secondary, and upper secondary education, where this item accounts for more than half of total spending. It is thus particularly instructive to trace the differences in unit spending on teacher salaries to differences in salary levels per staff and student-teacher ratios. Table 3.12 shows that while teachers in upper secondary and vocational/technical education earn, on average, about 40 percent more than primary school teachers, the student-teacher ratios at these levels are about five times more favorable. Similarly, the smaller student-teacher ratio in lower secondary schools is the main reason why spending per student on teachers at this level is more than three times that in primary schooling.

Cross-country data bring additional perspective to the discussion. Table 3.13 presents data on teacher salaries and pupil-teacher ratios across broad regions of the world. (Note that the international data relate to the education system as a whole, while those for Madagascar pertain to the public sector.) Relative to other francophone African countries, teacher salaries in Madagascar are modest, but they are comparable to the salaries of teachers in all other world regions. Moreover, as Box 3.1 demonstrates, the salaries are consistent with prevailing labor market conditions in the country, implying that there is probably no immediate urgency to reforming the overall level of teacher pay. The cross-country data suggest that the pupil-teacher ratio is on the high side in Madagascar's public primary schools. The average for the secondary level is comparable to the averages for secondary education in nonfrancophone regions, but within secondary education the ratio of 10.6 in upper secondary education is probably too low.

What would be the impact on unit costs if the pupil-teacher ratio in public primary schools were lowered and that in upper secondary education were raised? Simulations based on the data in Table 3.12 and in the equations presented above show that lowering the pupil-teacher ratio in primary school to an average of about 40 pupils per teacher—a decrease of 25 percent—would raise overall per-pupil spending by 20 percent. For comparison, note that overall unit spending would fall by 6 percent if spending on overhead were cut by 25 percent and that it would rise by only 3 percent if spending on material inputs were increased by 25 percent. (The smaller percentages reflect the lower shares of spending on overhead and material inputs in total

Table 3.13
Teacher Salaries and Pupil-Teacher Ratios, Madagascar and Developing Regions, 1990s

	Average teacher salary as multiple of per capita GNP		Student-teacher ratio	
Country or region	Primary	Secondary	Primary	Secondary
Madagascar, 1998[a]	3.0	3.3	53.3	16.4
Regional averages, 1990s[b]				
Francophone Africa	6.3	7.6	53.2	30.7
Anglophone Africa	3.6		38.7	22.1
Latin America and the Caribbean	2.3	—	31.0	18.8
Asia	2.5	—	37.9	15.0
Middle East and North Africa	3.3	—	25.6	21.4
All countries	3.9	—	40.0	22.5

— Not available.
a. Data for secondary education are the weighted averages of lower and upper secondary education. All data refer to the public sector.
b. Data refer to countries with per capita GNP below US$1,000 in 1993; student-teacher ratios are systemwide averages. Differences between the data shown here for Africa and those in Box table 3.1 reflect differences in the composition of the samples.
Source: For Madagascar, Box table 3.1 and Table 3.12; for other regions, Mingat and Suchaut (2000).

spending.) These simulation results help clarify some of the policy tradeoffs in managing the cost of primary schooling, particularly in the context of tight budgets. A 25 percent increase in spending on material inputs is potentially a better option than a 25 percent decrease in the pupil-teacher ratio because it is both cheaper and more likely to enhance student learning. Most studies suggest that moving the pupil-teacher ratio toward the lower end of the 35–55 range is likely to produce only modest gains in learning and that an increase in spending to supply children with textbooks and other material inputs would probably achieve better results, particularly in situations where supplies are sparse to begin with.[20] Such pedagogical materials are indeed in short supply in many schools, as suggested by the findings of recent surveys on schooling conditions (see Madagascar 1999a).

Similar simulations in secondary education can help illustrate the potential tradeoffs in managing costs at this level. In upper secondary schooling, for example, raising the student-teacher ratio to an average of 15 would cut overall per-pupil spending by 16 percent. Because administrative overhead and school-level support staff services make up a significant share of costs at this level of education, reductions in these spending items will produce significant savings. For example, increasing the ratio of students to nonteaching staff to the same level as in lower secondary school (about 50 students per nonteaching staff) and cutting administrative overhead by 25 percent would lower unit spending by a combined 18 percent. All three changes together would produce total savings of 34 percent. By contrast, tripling per-student spending on material inputs would raise overall spending by only 8 percent. Although cost simulations such as those presented here provide only one piece of the information needed for policy development, the foregoing examples illustrate that they cannot be ignored in assessing potential options for intervention.

Conclusion

Education finance in Madagascar went through dramatic adjustments during the 1990s. Total government spending started out at around 3 percent of GDP at the beginning of the decade but fell to just 60 percent of that level by mid-decade. Although the level of spending had recovered to its 1990 level by 2000, most of the recovery reflected large increases in capital spending. Remarkably, as total spending decreased, the share in spending of lower levels of education rose while that of higher education fell, a shift that can be traced in large part to successful policies to reduce the large numbers of chronic repeaters among university students.

Yet the salutary shift in spending did not appear to have benefited primary education to any significant extent. Not surprisingly, therefore, household spending on primary education is substantial in Madagascar, accounting for roughly half of households' spending on all education services and about two-fifths of aggregate public and private spending on primary education. A third of household spending on primary schooling flows to public primary schools, where household contributions enable some schools to hire extra teachers to make up for shortfalls in the government's allocation of state-paid teachers. These features of education finance have produced a structure of public spending per student that favors primary education to a smaller extent in Madagascar relative to other levels than in most other developing countries.

Aggregate spending on education appears likely to rise, in the context of debt relief agreements. It would therefore seem appropriate to ensure that most of the increase benefits primary education and that it is appropriately targeted to lighten the financial burden of schooling for families already living in economic distress. At the same time, better management of resources will be important, particularly at postprimary levels, where school-level administration and support services and system overhead together absorb between two-fifths and two-thirds of public spending each at these levels. Throughout the system, there thus appears to be potential scope for redirecting the allocation of public spending to reinforce teaching services and material support and so promote effective service delivery.

Notes

1. Because of lack of data, spending on education by businesses and other social organizations is not included here in evaluating the magnitude of national spending on education.

Donors' official contributions are counted as part of government spending.

2. Note that because GDP in real terms grew at about the same rate during this period, public spending on education as a percentage of GDP remained at the same level in 2000 as in 1990—around 3 percent.

3. Enrollments were tightened by, for example, weeding out "professional students" and setting limits on the number of times a student could repeat. At the same time, distance education was launched, and steps were taken to encourage private sector provision of higher education. See Chapter 7 for further discussion of higher education.

4. At the primary level the staff counts include teachers who are hired and paid directly by parents. Time-series data are not available on how their numbers have evolved over time, but the data for 1999 suggest that teachers paid by parents make up about 5 percent of the total number of teachers.

5. The estimates of household spending on education presented here are based on data from the 1997 *Enquête Prioritaire auprès des Ménages*. They may be underestimated to the extent that households neglect to report in-kind contributions of labor and materials for school construction and other activities.

6. Spending on school uniforms is included in this estimate even though it is recognized that children need clothes whether or not they attend school.

7. The estimate for primary education is obtained by multiplying aggregate primary school enrollments by estimates of household spending per primary school child as reported by the 3,207 families sampled in the 1997 *Enquête Prioritaire auprès des Ménages* who had children enrolled only at that level of schooling. The selection criterion was necessary because the survey questionnaire did not ask for separate responses by level of education. Because of sample size problems, the same approach could not be applied to separate estimates for the other levels of education.

8. Mobilizing such parental contributions is a familiar approach for enhancing community participation in education, the argument being that it strengthens local ownership of the school being built or rehabilitated. In Madagascar the practice is formalized under the *contrat-programme* arrangement. A tripartite agreement among parents, the staff of the school, and the government is drawn up on paper. The agreement specifies each party's obligations—for example, the government's responsibility to provide financial resources or to post new teachers, the parents' contribution of labor and materials for school construction and rehabilitation, and the staff's delivery of schooling outcomes as measured by such indicators as number of children enrolled, school survival rates, and examination results.

9. The fact that primary education claims about half the government's total spending on education and also about half of households' total spending on education implies that households' share of total spending on primary education is the same as their share of national spending on all levels of education, reported at 36 percent in Table 3.3. That proportion is close to the 40 percent derived in Table 3.4.

10. As noted earlier, the magnitude of household spending on public schools is almost certainly an underestimate, as it excludes parental contributions for constructing and rehabilitating public primary schools.

11. Again, the amount may be underestimated to the extent that it ignores other resources that the government offers to private schools, such as free books in some donor-financed education projects.

12. Because of the high degree of aggregation, budget documents may also fail to reveal potential sources of misreporting, such as the possibility that civil servants included under one budget vote may in fact be assigned for duties elsewhere. The approach outlined here also provides an independent consistency check on the reported budget.

13. The salary cost per staff member at each grade includes the base salary plus cash benefits *(primes)* and the government's pension contribution.

14. Some overheads, such as those for preparing and conducting the national examinations, benefit all students in the system and would therefore be more appropriately apportioned according to the distribution of students by level rather than by the distribution of teachers. This refinement in the calculations was not made because of constraints in the data.

15. Some spending at the institutional level, particularly in higher education, may fall into the overhead category, as well, but the amount is unidentifiable from the available data.

16. In this regard, it is interesting to note that according to data in Littman and Gaquin (2000), about 72 percent of current spending on primary schools in the United States in 1998–99 was devoted to what would correspond to core business and core business support in the terminology used here.

17. Counting only the resources devoted to teaching and teaching support at the school level, the amount is estimated as the sum of spending per pupil at each level multiplied by the corresponding index of student flow efficiency presented in Chapter 2.

18. The level of public spending per student in the system is a broad measure of the intensity of public spending across the three levels of education. Because of differences in data definitions, cross-country comparisons based on this indicator should obviously be interpreted with care, particularly in higher education, where the data may not fully capture enrollments in the private sector and where the treatment of enrollments in distance education may differ.

19. The disaggregation can be done for all levels of education, but because of space considerations we show the results here only for primary, secondary, and vocational/technical education. The slight differences between Tables 3.10 and 3.11 in estimated overall spending per pupil reflect rounding errors. The closeness of the estimates also implies that the estimates of the underlying cost components are largely reliable.

20. Most studies suggest that variation in the pupil-teacher ratio in the 35–55 range has limited impact on student learning (see Hanushek 1986). The reason is that most teachers would teach a class of 35 pupils more or less the same way as they would a class of 55.

4

Some Aspects of Equity in Education

Chapters 2 and 3 considered the performance of Madagascar's education system in aggregate terms without making a distinction among population groups. In this chapter the focus is on social disparities in education, particularly as they pertain to enrollments and student flow patterns and as they are manifested in the incidence of public spending on education. In Madagascar girls are as likely to attend school as boys throughout most of the system, but there are sharp differences between urban and rural areas, across provinces, and among income groups in access to grade 1 and in survival to the end of the primary cycle. These disparities combine with a structure of public spending per student that rises steeply with level of education to produce a distribution of public spending on education that is highly inequitable in comparison with the pattern in other countries. Simulations presented in this chapter suggest that policies to reduce the incidence of dropout in the primary cycle and to restructure the pattern of public spending per student in favor of primary education are among the more promising avenues for redressing the inequities.

Overview of Disparities in Enrollments

That regional disparities exist is obvious from the data on gross enrollment ratios shown in Table 4.1. Toliara lags substantially behind the rest of the country, with a ratio of only 65 percent of the relevant age group enrolled in primary education in 1998–99, compared with the national average of 107 percent. In both lower and upper secondary education Toliara's gross enrollment ratios are only half as high as the corresponding national averages. Wide disparities also differentiate urban and rural areas. At the secondary level the gaps occur in part because secondary schools tend to be located in urban areas. Since some of their students almost certainly come from rural areas, the disparities shown in the table very likely overstate the urban bias of enrollments. Nonetheless, the gaps are very wide and suggest that rural children are probably at a disadvantage in access to secondary schools. The table also suggests that in contrast to the pattern in most low-income countries, girls in Madagascar attend school at about the same rate as boys. Finally, looking at the 1990s as a whole, the disparities in enrollments appear to have remained relatively stable during the decade.

The gaps among localities and population groups show up even more clearly in Table 4.2, where the distribution of the school-age population is compared with the distribution of enrollments in each cycle of education. For example, in 1999 Antananarivo accounted for 28 percent of the population age 6–10 (the official age range for the primary cycle) but enrolled 32 percent of all primary school pupils, giving it a representation index of 1.13 (= 32/28). By contrast, Toliara's index was only 0.61, implying that it has less than its population share of pupils in the system. Taking Antananarivo as the reference, we compute a relative representa-

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Table 4.1
Gross Enrollment Ratios by Province, Urban-Rural Locality, and Gender, Madagascar, 1990–99

	Primary			Lower secondary		Upper secondary	
	1990–91	1994–95	1998–99	1994–95	1998–99	1994–95	1998–99
All Madagascar	104	90	107	19	20	7	6
BY PROVINCE							
Antananarivo	116	104	121	30	29	11	11
Antsiranana	121	115	132	18	20	6	6
Fianarantsoa	100	78	106	15	15	5	5
Mahajanga	95	92	102	14	16	4	4
Toamasina	117	96	115	16	19	5	4
Toliara	65	56	65	10	11	4	3
BY LOCALITY							
Urban	—	117	115	65	63	34	33
Rural	—	86	102	13	14	3	3
BY GENDER							
Boys	105	87	107	19	20	—	7
Girls	103	93	106	19	20	—	6

— Not available.
Source: Authors' computations based on data supplied by the MINESEB.

tion index. For Toliara the index is 0.54, which implies that the rate of participation in primary education in the province is only 54 percent as high as in Antananarivo.

The pattern in the relative representation index is revealing as to the evolution of educational disparities in the system. Among provinces, Antananarivo, Antsiranana, and Toamasina were overrepresented in the primary cycle, but only Antananarivo retained an advantage beyond the primary level. In the upper secondary cycle the representation index relative to Antananarivo ranged from 0.29 for Toliara to a high of only 0.54 for Antsiranana. The gap between urban and rural areas is even more striking: whereas the representation index for rural areas relative to urban localities was 0.89 at the primary level, it fell to 0.23 in lower secondary education and to only 0.10 by the upper secondary cycle. As noted, secondary schools tend to locate in urban areas and very likely enroll students from rural areas. The urban-rural gaps shown in the table are thus likely to overstate the urban bias of access to secondary school.[1]

The overall picture that emerges is one of a post-primary school system that is characterized by rapid urbanization and is increasingly heavily concentrated in Antananarivo. To the extent that upper secondary schools are the source of future teachers for rural primary schools, and in light of the difficulties of attracting teachers to live and work in rural areas, the current spatial distribution of secondary school enrollments is likely to perpetuate rather than help address the problem.

Disparities in Patterns of Student Flow

Possible factors in the enrollment disparities across localities and population groups include differences

Table 4.2
Distribution of School-Age Population and Enrollments by Locality and Gender, Madagascar, circa 1999

Grouping	Primary education				Lower secondary[a]		Upper secondary[a]	
	Percentage of population age 6–10	Percentage of pupils	Representation index[b]		Representation index[b]		Representation index[b]	
			Absolute	Relative	Absolute	Relative	Absolute	Relative
BY PROVINCE								
Antananarivo	28	32	1.13	1.00	1.46	1.00	1.76	1.00
Antsiranana	8	10	1.23	1.09	1.18	0.80	0.96	0.54
Fianarantsoa	21	21	0.99	0.87	0.76	0.52	0.73	0.42
Mahajanga	11	11	0.95	0.84	0.76	0.52	0.61	0.34
Toamasina	17	18	1.07	0.94	0.98	0.67	0.68	0.39
Toliara	15	9	0.61	0.54	0.51	0.35	0.50	0.29
All provinces	100	100	..	..	..	..	..	..
BY LOCALITY								
Urban	11	12	1.11	1.00	3.19	1.00	4.95	1.00
Rural	89	88	0.99	0.89	0.73	0.23	0.52	0.10
Both	100	100	..	..	..	..	..	..
BY GENDER								
Boys	51	51	1.01	1.00	1.01	1.00	1.03	1.00
Girls	49	49	0.99	0.99	0.99	0.98	0.97	0.95
Both	100	100	..	..	..	..	..	..

.. Not applicable.
a. Because of space constraints, data on percentage of population and percentage of students are omitted for the secondary levels.
b. The representation index is intended to show how well the distribution of enrollments maps to that of the population. The absolute index is defined as the ratio between the share of enrollments and the share of the population in the relevant age group. The relevant age groups are 6–10 for primary education, 11–14 for lower secondary education, and 15–17 for upper secondary education. The relative index is defined as the absolute index divided by the absolute index for the most advantaged group.
Source: Computed from data on the school-age population and enrollments supplied by the MINESEB.

in entry rates to grade 1 in the primary cycle, in survival rates to the end of each cycle, and in rates of transition from one cycle to the next. As indicated in Chapter 2, the Malagasy system is not highly selective between cycles of education, implying that the last factor is unlikely to be significant in accounting for the disparities in enrollments across groups. Furthermore, survival rates are dramatically lower in the primary cycle than in either of the two secondary cycles. The following discussion therefore focuses mainly on disparities in the pattern of student flow in the primary cycle.

Entry rates to grade 1

To facilitate interpretation of the data, the last two columns of Table 4.3 express grade 1 entry rates relative to the first group in each block. The data show that relative rankings in all four sets being compared remained more or less stable between 1992 and 1997. Among provinces, Fianarantsoa, Mahajanga, and Toliara are some distance from achieving universal entry to grade 1; the lag is particularly large in Toliara. Entry rates in rural areas fall behind those in urban areas by about 25 per-

Table 4.3
Disparities in Entry Rates to Grade 1, Madagascar, 1997

Grouping	Grade 1 entry rate (percent)		Relative rate[a]	
	1992	1997	1992	1997
All Madagascar	81	81		
BY PROVINCE				
Antananarivo	91	93	1.00	1.00
Antsiranana	88	86	0.96	0.93
Fianarantsoa	71	77	0.78	0.82
Mahajanga	79	74	0.86	0.80
Toamasina	87	86	0.95	0.93
Toliara	61	58	0.67	0.63
BY LOCALITY				
Urban	91	99	1.00	1.00
Rural	76	75	0.83	0.76
BY GENDER				
Boys	79	81	1.00	1.00
Girls	82	82	1.03	1.01
BY INCOME GROUP[b]				
Rich	98	99	1.00	1.00
Middle income	85	78	0.87	0.78
Poor	73	66	0.75	0.67

a. Relative to the first group in each block.
b. The income groups are defined using principal-components analysis of asset ownership, following the method described in Filmer and Pritchett (1998). The rich group refers to the top 20 percent of school-age children ranked by household asset ownership, the middle-income group refers to the middle 40 percent, and the poor group refers to the poorest 40 percent.
Source: Computed from 1992 and 1997 Demographic and Health Surveys, 1993–94 *Enquête Permanente auprès des Ménages*, and 1997 *Enquête Prioritaire auprès des Ménages*.

cent, and there are significant gaps across income groups, with the entry rate for the poorest group being only about two-thirds as high as that for the richest group. There is hardly any gap between boys and girls in terms of entry rates to grade 1.

Survival rates to end of primary cycle

As indicated in Chapter 2, survival rates in Madagascar's education system are modest, with only a third of the entrants reaching the end of the complete cycle. Table 4.4 shows that this average hides wide disparities across provinces, urban and rural localities, and income groups. Toliara again lags, with a relative survival rate of 47 percent, and Fianarantsoa's rate is even lower. Survival rates are 27 percent as high in rural areas as in urban areas and only 12 percent as high among children from the poorest families as among children from the top income group. The middle-income group does not fare much better, with a survival rate only 30 percent that of the richest income group.

Access to postprimary education

Ideally, we need data on the socioeconomic composition of students enrolled in postprimary education in order to evaluate disparities in this regard. In the absence of such data, we use instead two pieces of information that are more readily available: (a) enrollment rates across socioeconomic groups in grade 5, the last grade in the primary cycle, which reveal differences in eligibility for postprimary schooling, and (b) survey data on attainment in lower and upper secondary education.

The enrollment rate in grade 5 is calculated simply as the product of the entry rate to grade 1 and the survival rate to the end of the primary cycle. The results appear in Table 4.5. The provinces fall into three categories:

- Antananarivo and Antsiranana, where children have the best chances of proceeding to postprimary levels of education, reflecting the combined influence of relatively high entry and survival rates in the primary cycle.
- Mahajanga and Toamasina, where children's chances of continuing to higher levels are smaller, given that the grade 5 enrollment rate is about 60 percent as high as in the leading provinces. (Entry rates to grade 1 are comparable to those in Antananarivo and Antsiranana, but rates of survival to the end of the cycle are lower.)

Table 4.4
Disparities in Rates of Survival to Grade 5, Madagascar, 1997

Grouping	Survival rate (percent)		Relative rate[a]	
	1992	1997	1992	1997
Madagascar	31	33		
BY PROVINCE				
Antananarivo	40	48	1.00	1.00
Antsiranana	40	43	0.99	0.89
Fianarantsoa	23	22	0.56	0.46
Mahajanga	31	34	0.78	0.70
Toamasina	34	31	0.85	0.64
Toliara	20	23	0.51	0.47
BY LOCALITY				
Urban	54	61	1.00	1.00
Rural	16	16	0.30	0.27
BY GENDER				
Boys	31	35	1.00	1.00
Girls	31	32	1.00	0.91
BY INCOME GROUP				
Rich	65	70	1.00	1.00
Middle income	27	21	0.41	0.30
Poor	8	9	0.12	0.12

a. Relative to the first row in each block.
Source: Computed from data files supplied by the MINESEB on enrollments and repeaters by grade.

Table 4.5
Disparities in Grade 5 Enrollment Rates, Madagascar, 1997

Grouping	Grade 5 enrollment rate (percent)		Relative rate[a]	
	1992	1997	1992	1997
Madagascar	25	27		
BY PROVINCE				
Antananarivo	37	44	1.00	1.00
Antsiranana	35	37	0.95	0.83
Fianarantsoa	16	17	0.44	0.38
Mahajanga	25	25	0.67	0.56
Toamasina	29	27	0.81	0.60
Toliara	12	13	0.34	0.30
BY LOCALITY				
Urban	49	60	1.00	1.00
Rural	12	12	0.25	0.20
BY GENDER				
Boys	25	28	1.00	1.00
Girls	26	26	1.03	0.92
BY INCOME GROUP				
Rich	63	70	1.00	1.00
Middle income	23	17	0.36	0.24
Poor	6	6	0.09	0.08

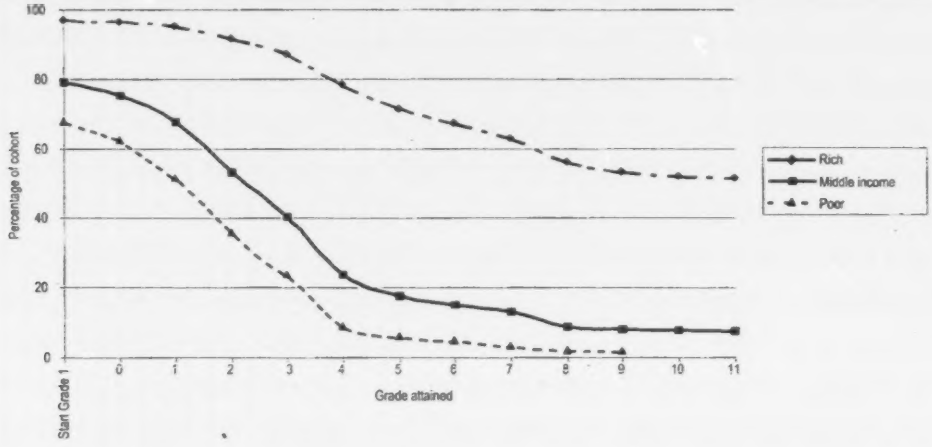
Note: The enrollment rate refers to the proportion of an age cohort that is enrolled in school; it is computed here as the product of the entry rate to grade 1 and the survival rate to grade 5, using the data for these indicators from Tables 4.3 and 4.4.
a. Relative to the first row in each block.
Source: Tables 4.3 and 4.4.

- Fianarantsoa and Toliara, where the chances that a child will proceed to the next cycle are no more than 40 percent as high as in the leading provinces. In Fianarantsoa the problem arises mainly because of high dropout rates, while in Toliara it stems from the combined problems of low entry rates and low survival rates in the primary cycle.

The rest of the table shows the expected patterns of disparities: children in rural areas and those from the poorest families fare dramatically worse than those in urban areas and from richer families. The main reason in both cases is that survival rates to the end of the primary cycle are so much lower among these groups. By the end of the primary cycle disparities between boys and girls also begin to emerge, reflecting the influence of a slightly higher dropout rate among girls in the primary cycle.

The disparities in schooling beyond grade 5 are documented in Figure 4.1 for a sample of youths age 15–19 surveyed in 1997. It is noteworthy that the gaps in attainment beyond grade 5 are relatively stable among the three socioeconomic groups—rich, middle income, and poor. The implication is that the

Figure 4.1
Grade Attainment Profile of Cohort Age 15–19, Madagascar, 1997



Source: Authors' estimate based on 1997 Madagascar Demographic and Health Survey.

bulk of the observed differences in access to postprimary education across income groups is traceable to the low entry rates to grade 1, and especially to the poor rates of survival in primary education.

Incidence of Public Spending on Education

Because only those who attend school benefit from public spending on education, the disparities in enrollments and student flow discussed above have obvious implications for the incidence of public spending. We examine this issue from two related perspectives: (a) across a cohort of children according to their longevity in the system and (b) across socioeconomic groups. The first perspective focuses on the inequities stemming solely from the structure of enrollments and public spending per student across levels of education. The second incorporates the influence of social selectivity in access to education.

Incidence of spending across members of a cohort

Given the grade-specific enrollment rates (Table 4.6), we first compute the distribution of each cohort of children by terminal level of school attainment. For example, in a cohort of 100 we know that 81 percent enroll in grade 1, which implies that 19 children in the cohort (= 100 – 81) have never gone to school. Similarly, we can deduce that 24 (= 81 – 57) children would have gone only to grade 1, given the enrollment rate of 57 in grade 2. Using information on the structure of spending per student at each level of education, we compute in the next step the cumulative spending that a cohort member receives according to his or her longevity in the system. For example, a person exiting at grade 5 would receive a cumulative total of 0.40 times per capita GNP (= 5 × 0.08) over the five years that he or she was in the system. Combining the result with those on the distribution of terminal schooling in the cohort obtained in the first step, we can compute aggregate cumulative spending for all cohort members who exit the system at the same point. The last two columns of the table show the percentage distribution of the population arranged in order of educational attainment and the corresponding distribution of public spending on education for the entire cohort. The bottom of the table provides summary measures of the incidence of public spending on education, viewed from a cohort perspective. These measures reinforce the conclusion that public spending in Madagascar is indeed heavily biased in favor of those who are highly advantaged: the current structure of enrollments and unit spending implies that the best-educated 10 percent in a cohort receives an incredible 63

Table 4.6
Incidence of Public Spending on Education among Members of a Cohort, Madagascar, 1999

Level of education and grade		Enrollment rate (percent)	Distribution of cohort of 100 by terminal level of schooling[a]	Public spending on education as ratio to per capita GNP			Cumulative share of cohort total (percent)	
				Per student				
				Annual	Cumulative to exit from system	Total over cohort members	Population	Public spending
No schooling			19	0	0	0	19	0
Primary	1	81	24	0.08	0.08	1.88	43	3
	2	57	10	0.08	0.16	1.56	53	7
	3	47	12	0.08	0.23	2.81	65	12
	4	35	8	0.08	0.31	2.50	73	17
	5	27	9	0.08	0.40	3.52	82	24
Lower secondary	6	18	3	0.22	0.61	1.82	85	27
	7	15	2	0.22	0.82	1.64	87	30
	8	13	1	0.22	1.04	1.04	88	32
	9	12	6	0.22	1.25	7.51	94	46
Upper secondary (3 years)		6	4	0.44	2.56	10.25	98	66
Higher[b]		2	2	1.57	8.84	17.69	100	100
All levels		..	100	..	..	52.22	..	..
Memorandum: Summary measures of equity in the incidence of spending								
Share of resources received by best-educated decile in a cohort (percent)[c]							63	
Gini coefficient[d]							0.74	

.. Not applicable.
a. See text for derivation of the figures in this column.
b. Assumed to last four years for the purpose of the calculations here.
c. See text for derivation of this figure.
d. The Gini coefficient captures the degree of equity in the distribution. A value of 1 represents extreme inequality, and a value of 0 represents complete equality.
Source: Authors' calculations based on data on enrollment rates and public spending presented in Chapters 2 and 3.

percent of the government's aggregate spending on education over the cohort's schooling career.

To put Madagascar's distribution of spending on education in perspective, Table 4.7 presents the results of similar calculations for Sub-Saharan Africa and other world regions. Countries in Sub-Saharan Africa generally have more inequitable patterns of spending than those in Latin America, Asia, or the Middle East, but Madagascar is at the high end of the spectrum even among African countries.

Incidence of spending across socioeconomic groups

Because those who survive longest in the education system tend to come disproportionately from better-off families, we expect the bulk of public spending on education to benefit children from such families. This expectation is confirmed by the calculations based on data for Madagascar from household surveys in 1993 and 1997 (Table 4.8).[2] In

Table 4.7
Incidence of Public Spending on Education, Madagascar and Developing Regions, 1990s

Country or region	Number of countries	Gini coefficient	Percentage of resources benefiting best-educated 10 percent in a cohort
Madagascar, 1999	1	0.74	63
Regional averages, 1990s			
Francophone Africa	12	0.66	57
Anglophone Africa	8	0.62	53
Latin America and the Caribbean	6	0.37	29
Asia	8	0.43	33
Middle East and North Africa	4	0.44	31

Source: For Madagascar, Table 4.6; for regional averages, Mingat and Suchaut (2000).

1997 the bottom 20 percent of the population received only 7 percent of government spending on education, while the top 20 percent received 36 percent, implying that the rich received more than five times as much as the poor. The ratio remained unchanged between the two survey years.

For comparison, the table includes the results from applying the same calculation to recent household survey data for selected other countries. Although cross-country comparisons should be treated with caution because of differences in survey methods and definitions, the results nonetheless suggest that public spending on education is much more biased in favor of the rich in Madagascar than in other developing countries, in Africa or elsewhere. Madagascar's rich-poor ratio is the second highest in the sample of 13 countries and is nearly twice as high as that for Lao PDR, the country with the third-highest ratio.

Assessing the Impact of Alternative Interventions for Improving Equity

What interventions would help reduce inequities in the incidence of public spending on education? To answer this question, we perform several simulations to assess the influence of policies designed to affect two main features of the education system: the structure of public spending per student by level of education, and the pattern of student flow.

The second column in Table 4.9 presents the initial conditions; the remaining columns reflect the assumptions of the simulations and present the results. The shaded areas indicate parameters that remain unchanged from the initial conditions. In simulation A the structure of public spending per student is changed to that characteristic of countries in Latin America, Asia, and the Middle East—typically, regions with a more equitable structure in unit spending across levels of education. In simulation B the primary school survival rate is raised to the rate prevailing among private schools in Madagascar. In simulation C the entry rate to grade 1 is increased from the current rate in Madagascar to the average of 94 percent for Latin America, Asia, and the Middle East. In simulation D student flow indicators in lower secondary education—that is, the transition rate from the primary cycle and the survival rate to the end of the cycle—are raised to the averages for countries in Latin America, Asia, and the Middle East. In simulation E the entry rate to grade 1 and the survival rate to the end of the primary cycle are both raised to the corresponding averages for countries in these regions. Finally, in simulation F the structure of public spending per student across levels of education is made the same as that for countries in Latin America, Asia, and the Middle East, while the survival rate to the end of the primary cycle is improved to the level among private schools within Madagascar.

Table 4.8
Share of Public Spending on Education Benefiting the Poorest and Richest Population Quintiles, Madagascar and Selected Countries, 1990s
(percent, except as specified)

Country	Poorest quintile	Richest quintile	Rich-poor ratio[a]
Madagascar			
1993	8	41	5.1
1997[b]	7	36	5.1
Other Sub-Saharan African countries			
Côte d'Ivoire, 1995	13	35	2.7
Ghana, 1992	16	21	1.3
Guinea, 1994	5	44	8.8
Kenya, 1992	17	21	1.2
Malawi, 1994	16	25	1.6
South Africa, 1994	14	35	2.5
Tanzania, 1993–94	14	37	2.6
Uganda, 1992	13	32	2.5
Other developing countries			
Bulgaria, 1994–95	17	21	1.2
Indonesia, 1989	15	29	1.9
Pakistan, 1991	16	22	1.4
Lao PDR, 1993	12	34	2.8

a. Ratio of the share of the richest quintile to that of the poorest quintile.
b. Data refer to the distribution of spending on primary and secondary education only.
Source: For 1997 data for Madagascar, Madagascar (2000d); for all other items, World Bank EdStats database, based on various household surveys on living standards.

The results are instructive as to the impacts that alternative interventions would have on equity in the incidence of public spending on education, as seen in the last two rows of the table. First, improving student flow in secondary education (simulation D) would have little effect on equity. Modest gains follow from interventions in each of the following domains: changing the structure of spending per student across levels of education (simulation A); improving the survival rate to the end of the primary cycle (simulation B); raising entry rates to grade 1 (simulation C); and simultaneously raising both the entry and survival rates in primary schooling (simulation E). Combining a change in the structure of public subsidies across levels of education with improvements in the survival rate to the end of the cycle—simulation F—enhances equity the most, reducing the share of the best-educated decile in a cohort from the current level of 63 percent to 40 percent. This result would bring Madagascar closer to the pattern in low- and middle-income countries outside Africa.

Conclusion

This chapter has examined two aspects of equity in education: (a) the distribution of enrollments across provinces, urban-rural localities, genders, and income groups, and (b) the incidence of public spending on education. Unlike the situation in most low-income countries, educational differences between boys and girls are modest in Madagascar, with a small bias against girls beginning to emerge only in upper secondary education. The main distinctions are among provinces, across urban-rural areas, and across income groups. The disparities are indeed substantial and explain why the incidence of public spending on education in Madagascar is one of the most inequitable among low- and middle-income countries. Improving entry and survival rates in primary education—especially in the lagging provinces of Fianarantsoa and Toliara, in rural areas, and among the poorest income groups—and restructuring unit spending in favor of primary education are two of the most effective ways of bringing about significant equity gains in the system.

Table 4.9
Simulations of the Equity Impact of Alternative Structures of Unit Spending on Education and Student Flow, Madagascar

Indicator, by educational level	Initial conditions	Simulation A	B	C	D	E	F
Public spending per student as ratio to per capita GNP							
Primary	0.08	0.09[a]					0.09[a]
Lower secondary	0.22	0.20[a]					0.20[a]
Upper secondary	0.44	0.20[a]					0.20[a]
Higher	1.57	0.83[a]					0.83[a]
Student flow pattern (percent)							
Primary cycle							
Entry rate to grade 1	81			94[a]		94[a]	
Survival rate to end of cycle	33		53[b]			73[a]	53[b]
Lower secondary cycle							
Transition rate from primary cycle	65				78[a]		
Survival rate to end of cycle	67				83[a]		
Upper secondary cycle							
Transition rate from previous cycle	47						
Higher education							
Transition rate from upper secondary cycle	33						
Summary measures of equity							
Share of resources received by best-educated decile in the cohort (percent)	63	52	52	57	64	50	40
Gini coefficient[c]	0.74	0.68	0.66	0.67	0.76	0.63	0.57

Note: See text for the assumptions used in the simulations. Shaded areas indicate no change from initial conditions.
a. Same rate as the average for countries in Latin America, Asia, and the Middle East.
b. Same rate as in the private sector in Madagascar.
c. The Gini coefficient captures the degree of equity in the distribution. A value of 1 represents extreme inequality, and a value of 0 represents complete equality.
Source: Authors' estimates based on data presented in Chapters 2 and 3 on public spending on education per student and on student flow.

Notes

1. Survey data nonetheless confirm that urban youths have much better access to secondary education. Among the population age 15–19 surveyed in the 1997 Demographic and Health Survey, the enrollment rate in lower secondary school was 8 percent among rural youths but 49 percent among their urban counterparts, implying a relative access rate for rural youths only 16 percent as high as that for urban youths. At the upper secondary level the corresponding enrollment rates were 6 and 42 percent, implying a relative access rate only 14 percent as high.

2. The table shows the shares of public spending benefiting the poorest and richest quintiles. These shares are computed using the following general formula:

$$x_j = \sum_{i=1}^{3} e_{ij} \cdot s_i$$

where x_j is income group j's share of total public spending on education; e_{ij} denotes the group's shares of enrollments in primary, secondary, and higher education; and s_i denotes the shares of public spending across the three levels of education. (See Demery 2000 for further details on this method.)

5

Primary and Secondary Education

The primary and secondary levels of education are in many ways the core of the education system. They serve the largest number of students, absorb the biggest share of total spending on education, and serve as the bedrock for human capital development. The system's performance at these levels is therefore critically important. How well are the public resources currently available for primary and secondary schooling in Madagascar being used? What are the constraints in service delivery, and what options exist for easing them? What tradeoffs are involved in improving the system's performance, and how can they be managed to achieve the best results within the budget constraints?

To inform the discussion on these issues, this chapter begins with a summary of what we know about the demand for education in Madagascar and goes on to document some of the main operational features of the primary and secondary school system and its responsiveness to that demand. It focuses, in particular, on the supply infrastructure and its characteristics, the distribution of resources across schools as mediated through the deployment of teachers and other personnel, the nature of scale economies in service delivery, and the relation between resource inputs and student learning.

Demand for schooling in Madagascar appears strong in most parts of the country (except perhaps in Toliara), yet dropout rates are extraordinarily high in primary education. While poverty, low levels of parental education, and the conflict between the school calendar and agricultural work cycles certainly motivate early exit from the system, there are indications that the supply of services, especially in the public sector, is inadequate in key dimensions of quality. In particular, the allocation of resources across schools in the public sector appears inequitable and inefficient. The result is that while some schools enjoy very favorable conditions, others—particularly primary schools in rural areas—struggle with too few teachers and resources to provide adequate services. Multigrade teaching is common in Madagascar, but its implementation still leaves far too many children with less than the full-day instruction needed for exposure to the complete curriculum. Economies of scale in service delivery exist at all levels of instruction, suggesting that there may be significant payoffs to policy development that takes advantage of them. Similar gains can probably be obtained by tightening management of the teaching and learning processes at the classroom level to ensure that the public resources allocated to schools are systematically transformed into progress in student learning.

Demand for Schooling

Entry rates to grade 1 and the pattern of survival to subsequent grades provide key measures of the demand for schooling. As earlier chapters have documented, entry rates in Madagascar are high, with about 80 percent of each birth cohort eventually starting first grade, but survival rates to the end of

the primary cycle average only 33 percent. These patterns, which have remained unchanged for most of the past decade, mask wide disparities across regions and socioeconomic groups. Thus, while entry rates are nearly 100 percent in Antananarivo and among the richest segments of society, they fall to as low as 58 percent in Toliara and 66 percent among the poorest 40 percent of the population. Survival rates range from about 50 percent in Antananarivo to just over 20 percent in Fianarantsoa and Toliara, and from 70 percent among the richest households to only 9 percent among the poorest.

These patterns of school attendance reflect the outcome of interactions between households' willingness and ability to invest in their children's schooling and the supply of services. The fact that most households start their children off in school suggests that Malagasy parents understand and appreciate the value of schooling. Indeed, many of them incur substantial out-of-pocket expenses to send their primary-school-age children to school, sometimes even paying for extra teachers to make up for staff shortages in the public schools. Transition rates between cycles of schooling are high, suggesting that even after the investment in basic education is completed, demand for education continues to be strong. This is confirmed by the high rates of repetition at the ends of the lower and upper secondary cycles. The strong demand also supports the existence of a large private secondary school system.

The problem of schooling demand in Madagascar appears, therefore, to involve two issues: (a) encouraging families to enroll the remaining 20 percent of children who currently do not even enter grade 1, and (b) motivating families to keep children in school for the full five-year primary cycle. In almost all studies on the demand for schooling, household income and parental education are key factors determining school attendance, and the available analyses for Madagascar are consistent with this pattern (e.g., Madagascar 1995a, 1995b, 1996; Chen 2000). These studies found that—in addition to those factors (which are beyond the reach of current education policy interventions), the influence of social norms, and the prevalence of child labor—the availability of schools and their characteristics matter.

A proper assessment of how demand responds to the specific characteristics of schools would require special data collection and analysis. Although this work is beyond the scope of the present study, the studies cited above provide some insights. Relying on data from the 1997 *Enquête Prioritaire auprès des Ménages*, Chen (2000) found that attendance rates are higher among children living in communities with better-quality schools, as reflected, for example, in the pupil-teacher ratio and examination pass rates. The other studies cited above were special projects involving dedicated data collection and were therefore even more specific in their findings. Madagascar (1995a), which was based on a 1992–93 survey of children in 157 public and private schools, concluded that policies in the following domains were important: reducing the distance to school, managing teacher absenteeism, instituting automatic promotion in the first few grades, providing school feeding, and adapting the school calendar to local agricultural cycles. In Madagascar (1995b), based on a 1994 survey of 69 villages in Fianarantsoa Province, school factors found to be important in explaining dropout behavior were the unavailability of a functioning school, the poor physical condition of the school, the unavailability of a full cycle of instruction at the school, attendance in a multigrade or part-day class, and lack of school supplies.

What all these studies suggest is that the supply characteristics of schools do affect the demand for schooling. In Chapter 2 we suggested that simply ensuring that complete cycles of primary schooling are available to all children would raise overall survival rates from 33 to 41 percent and that reducing repetition rates to 15 percent (or about half the current level) would boost the survival rate even more, to about 58 percent. If these changes are to materialize, significant improvements in service delivery will be required. We now turn to exploring the scope for progress in this regard.

Overview of the Supply of Education Services

We begin by describing the broad characteristics of the network of schools that offer primary and secondary education, focusing on their organizational characteristics, their distribution across provinces,

and a few key aspects of the arrangements for service delivery. The discussion also documents the extent of and trends in public subsidization of private sector schools. In contrast to the discussion in earlier chapters, the remainder of the chapter uses the school as the relevant unit of analysis.

Supply infrastructure

The system consists of nearly 13,000 schools, more than three-quarters of which are public and more than 90 percent of which offer primary schooling (Table 5.1). Schools are organized somewhat differently in the public and private sectors; almost all the public schools offer only a single level of instruction, while many of the private schools combine two or even three levels on the same premises. Overall, 83 percent of the schools serve rural populations, but the share is expectedly larger among public schools, reflecting the predominance of public primary and lower secondary schools in rural areas. At the upper secondary level, however, the rural focus is much weaker in the public sector. An estimated 6.8 percent of the public schools that offer the upper secondary cycle, either alone or in combination with lower secondary schooling, operate in rural areas, compared with about 25 percent in the private sector.[1] The pattern simply reflects the more common practice in the private sector of combining multiple levels of instruction under one roof rather than operating stand-alone services. As will be seen later, this arrangement not only extends private schools' reach to rural populations but also allows them to take advantage of economies of scope in service delivery.

The network of primary schools, both public and private, is distributed across provinces more or less in proportion to the distribution of children in the target age group (Table 5.2). The large number of public primary schools is a credit to the government's long-standing commitment to ensuring that schools are available throughout the country at the *fokotany* level. Over the years, however, much of the physical infrastructure has fallen into disuse for various reasons. Efforts are being made to reopen the closed schools, of which there are currently 3,000—nearly 40 percent of them concentrated in just one province, Fianarantsoa. In lower and upper secondary education, schools in both the public and private sectors are more likely to locate in Antananarivo than elsewhere in the country. The bias is more pronounced among private schools: close to

Table 5.1
Number and Distribution of Primary and Secondary Schools, Madagascar, 1998

	All schools in the system		Percentage distribution of schools by type of school and scope of service			Percentage of schools in rural areas		
Cycle of schooling offered	Total number	Percentage public	Public	Private	All schools	Public	Private	All schools
SINGLE CYCLE								
Primary	11,690	78.3	93.3	83.2	90.9	86.7	79.4	85.1
Lower secondary	618	91.3	5.8	1.8	4.8	82.8	42.6	79.3
Upper secondary	77	84.4	0.7	0.4	0.6	9.2	33.3	13.0
MULTICYCLE								
Primary and secondary[a]	389	0.0	0.0	12.7	3.0	..	43.9	43.9
Upper and lower secondary	82	28.0	0.2	1.9	0.6	0.0	27.1	19.5
All schools	12,856	76.3	100.0	100.0	100.0	85.8	73.0	82.7

.. Not applicable.
a. Includes schools offering two of three cycles (primary, lower secondary, and upper secondary) or all three.
Source: Based on MINESEB 1997-98 school census; total counts of establishments may not be complete due to late submission of data from some schools.

Table 5.2
Provincial Distribution of Primary and Secondary Schools, Madagascar, 1998
(percent)

Province	Share of population age 6–10	Distribution of primary schools		Distribution of secondary schools	
		Functioning schools	Closed schools[a]	Lower	Upper
Antananarivo	28	34	9	46	56
Antsiranana	8	6	6	6	4
Fianarantsoa	21	27	37	19	12
Mahajanga	11	5	16	5	9
Toamasina	17	18	12	13	11
Toliara	15	10	20	10	8
All provinces	100	100	100	100	100

a. The total number of closed schools fell from 3,267 in 1997–98 to 2,919 in 1998–99. The distribution shown here refers to the average for those two years.
Source: Based on MINESEB 1997–98 school census; for number of schools offering primary and secondary education, see Table 5.1.

two-thirds of private schools at all levels are located in the province, far above the share of 25–30 percent in the public system (see Appendix table A5.1).

Selected characteristics of public and private schools

Table 5.3 reveals some key features of service delivery in the two sectors. Within the private sector, churches and other religious organizations operate slightly less than half of the primary schools; the rest are run by secular groups. Consistent with the pattern in other developing countries, the share of these organizations declines as the level of schooling rises, dropping to about a third among upper secondary schools. School sizes tend to be similar in primary and lower secondary education, but in upper secondary schools the average number of students in public schools is more than twice that in private schools (or in the upper secondary sections in multicycle private schools). Most public primary schools operate with a higher pupil-teacher ratio than their private sector counterparts, but the pattern is clearly reversed at the secondary level. As expected, few primary schools have administrative and other support staff in addition to the teachers, while most secondary schools have these staff. In the primary schools lucky enough to be assigned administrative and support staff, the intensity of use (as reflected in the pupil-staff ratio) is slightly greater in the public sector. At the secondary levels, more public schools have administrative and support staff, and the intensity of use favors the public sector heavily, by a factor of between 3.9 and 5.6 times.

The composition of the teaching force shows some notable differences between the public and private sectors. Primary and lower secondary school teachers in private schools tend to be less experienced than those in public schools (by about one year or so), while upper secondary school teachers in the two sectors are comparable in this regard. Teachers in the private system also tend to be better educated; for example, 22 percent of those teaching primary school have at least the *baccalauréat* (obtained at the end of upper secondary education), compared with only 3 percent among their public sector peers.

It is likely that many teachers in private schools are part-timers with a regular job in a public school. Although it is not possible to estimate the extent of this practice with any accuracy from the available data, the differences in the educational profiles of the teachers in the two sectors suggest that private schools probably select only the better-educated public sector teachers to supplement their own staffs. Finally, it is interesting that at all three cycles

Table 5.3
Characteristics of Public and Private Schools, Madagascar, 1998

	Primary		Lower secondary		Upper secondary	
	Public	Private	Public	Private	Public	Private
SCHOOLS[a]						
Total number in sample	9,152	2,930	587	504	88	184
Share of religious schools (percent)	0	47.1	0	38.5	0	32.6
Students per school	144.4	132.4	209.0	197.4	318.7	137.9
Ratio of students to teachers	59.0	46.1	16.4	23.4	9.1	12.9
Share of schools with nonteaching staff (percent)	13.6	29.5	85.2	80.4	98.9	88.6
Ratio of students to nonteaching staff[b]	186.2	159.0	46.6	182.8	28.5	159.7
TEACHERS						
Average years of experience	5.9	4.7	6.5	5.4	5.9	6.0
Distribution by educational attainment (percent)						
Primary	1	10	1	1	1	1
Lower secondary	96	69	18	8	3	5
Upper secondary	2	19	76	61	40	29
Higher education	0	1	4	27	54	61
Other	1	2	2	3	2	4
Share with preservice training (percent)	81	20	63	7	41	8

a. Reflects unweighted averages across schools.
b. Average for schools with nonteaching staff only.
Source: Based on MINESEB 1997–98 school census.

of schooling many more public school teachers have had preservice training: at the primary level, the figures are 81 percent for public school teachers and 20 percent for private school teachers. At the lower secondary level, the shares are 63 and 7 percent, and at the upper secondary level, 41 and 8 percent.

For primary schools, significant diversity in the arrangements for service delivery exists between the public and private sectors and across provinces (Table 5.4). Nationwide, 61 percent of all public schools and 66 percent of the private schools enroll children in all five grades of the cycle, but the share in Antananarivo is much higher than the average, and it is quite low, in both the public and private sectors, in Fianarantsoa and Toliara. Another notable feature of primary schooling in Madagascar is that less than half of the public schools, but more than three-quarters of the private schools, offer full-time instruction. Again, conditions are far better in Antananarivo than elsewhere in the country, and they are consistently better in the private than in the public sector in all provinces except Antananarivo. As for multigrade instruction, the practice is, on average, slightly more widespread in private schools.[2] Its popularity in the private sector varies widely across provinces, however, ranging from 88 percent in Fianarantsoa to only 32–36 percent in Antsiranana, Mahajanga, and Toamasina. In the public sector the practice appears uniformly widespread in schools across the country except in Antananarivo, where the share is only 11 percent, compared with at least 72 percent everywhere else.

Table 5.4
Characteristics of Public and Private Primary Schools by Province, Madagascar, 1997–98
(percent)

Province	Share with pupils in all 5 grades		Share offering full-day instruction[a]		Share using multigrade teaching	
	Public	Private	Public	Private	Public	Private
Antananarivo	79.6	75.4	90.6	84.7	11.4	74.4
Antsiranana	62.0	82.6	44.3	66.7	74.3	32.6
Fianarantsoa	50.0	50.0	40.3	47.5	76.0	88.4
Mahajanga	59.2	74.4	42.6	84.5	79.7	32.2
Toamasina	59.6	74.3	49.9	76.1	85.5	36.3
Toliara	49.4	30.3	17.7	91.2	72.4	72.0
All provinces	61.1	66.1	43.5	75.8	61.5	73.8

a. Full-day instruction means at least 6 hours in a school day. See Appendix table A5.2 for a breakdown of the remainder of the distribution between half-day and less-than-half-day instruction.
Source: Based on MINESEB 1997–98 school census.

Public subsidization of private schools

Private schools in Madagascar receive subsidies from the government to defray part of their operating costs. The subsidies are channeled to eligible schools in two ways: (a) in the form of grants for individual schools (the size of the grants being determined using a scoring system designed to favor those with certain characteristics, e.g., serving rural populations) and (b) in the form of subsidies for individual teachers whose eligibility for them is determined on the basis of certain criteria such as their educational and teaching qualifications. Most of the subsidies to the private sector flow through school grants. The grants are aggregated for all recipients belonging to the same organization (such as the Catholic Church) and are processed as a lump-sum transfer, while the salary subsidies are processed as teacher-specific transfers. The first arrangement thus leaves room for cross-subsidization across schools (or even diversion to other activities) within each organization. The available data do not allow us to evaluate the extent to which that scope is utilized.

Table 5.5 shows the trends in public spending on subsidies to private schools during the 1990s. Consistent with the budget cuts throughout the education system at mid-decade, public subsidies to private schools fell from FMG 3.1 billion (in 1998 prices) in 1993 to only FMG 1.5 billion in 1995. As elsewhere in the system, spending has risen again, recovering by 1999 to about 90 percent of the 1993 level. Public subsidies accounted for less than 1 percent of total MINESEB spending throughout most of the 1990s.

In 1993 grants were allocated to 2,447 schools. The number of recipient schools then fell to a low of 1,902 in 1997 before recovering to 2,642 in 1999 (Table 5.6). The trends are uneven across provinces, with the recovery between 1993 and 1999 strongest in Antananarivo and weakest in Antsiranana and Toliara. In the latter two provinces, the number of subsidized schools in 1999 was still 14 to 18 percent short of the corresponding number in 1993.

Nationwide, 69 percent of private schools were subsidized in 1999. In that year, the average grant size was about FMG 762,000 per school, equivalent to about two months' salary for a public primary school teacher. Given the large number of schools allocated grants, it is not surprising that the distribution of beneficiary schools across provinces mirrors more or less the provincial distribution of all private schools. Antananarivo's share of subsidized schools, however, is smaller than its share of private schools in general, implying that schools outside the province were slightly better placed to receive a grant.

Table 5.5
Public Subsidies to Private Schools, Madagascar, 1993–99

Item	1993	1994	1995	1996	1997	1998	1999
Total subsidies to private schools[a]							
Millions of current FMG	1,100	999.4	1,100.1	2,000	2,700	2,700	2,940
Millions of 1998 FMG	3,105.9	1,998.8	1,508.7	2,341.5	2,945.5	2,700	2,794.5
Trend in spending (1993 = 100)	100	64	49	75	95	87	90
As share of total current MINESEB spending (percent)	1.0	0.7	0.6	0.9	1.0	0.8	0.7

Note: FMG, Malagasy francs.
a. Excludes administrative overhead of the Office National de l'Enseignement Privé, which amounts to about a tenth of total public spending on private education; includes grants to schools and salary subsidies for teachers.
Source: Based on data supplied by the MINESEB.

With regard to the salary subsidies, a total of 8,000 teachers (or just over 40 percent of all teachers in private schools) benefited in 1997, compared with 12,000 in 1993—more than 90 percent of all teachers in that year. The subsidy per teacher in 1997 amounted to between FMG 70,000 and FMG 90,000 a year, equivalent to about a week's salary for a public primary school teacher. In none of the provinces did the number of subsidized teachers recover to its 1993 level, but here too, the rate of recovery was strongest in Antananarivo. The provincial distribution of subsidized teachers is again quite similar to the distribution of all private schools, suggesting at best modest targeting in the allocation of the subsidies.

Emerging issues in the supply of services

Madagascar's early commitment to primary education is reflected in its extensive network of primary schools that today covers most of the country's 11,000 *fokotanys*. The presence of private schools at all levels of education is another asset, allowing a diversity and spread in the provision of services that a purely public system would probably not be able to offer. The evidence presented so far nonetheless suggests that perhaps not all is well in the system. At the primary level, the physical proximity of schools is obviously not the only ingredient needed to attract and retain children and, beyond that, to ensure that their experience in school produces tangible progress in learning. It would appear from the data presented so far that far too many public primary schools operate without adequate staffing (as the high pupil-teacher ratios would suggest), and far too few of them offer the full-day program that all children need for proper exposure to the curriculum.

In secondary education, schools become increasingly urbanized—as can be expected in any system seeking to economize on the costs of service delivery—and private sector participation becomes more widespread, with many of the schools receiving some financial support from the government. The relatively low student-staff ratios in public schools, in both the lower and upper secondary cycles, suggest possible deficiencies in staffing arrangements. With regard to the public subsidization of private schools, the assistance (which is a modest component of total public spending on primary and secondary education) currently benefits more than two-thirds of the private schools and more than two-fifths of the teachers, the large majority of them in Antananarivo. To the extent that the subsidies can be viewed as a mechanism for extending the reach of government-funded services to lagging communities, the current pattern of subsidization seems somewhat unfocused, and the criteria for allocating the subsidies may need to be reexamined.

The emerging issues listed above are elaborated in the rest of this chapter. Because of data constraints, the discussion concentrates mainly on

Table 5.6
Subsidized Private Schools and Teachers, Madagascar, 1993–99

Recipients of subsidies	1993	1994	1995	1996	1997	1999	Provincial distribution[a]
Subsidized schools							
Number	2,447	2,550	2,342	2,032	1,902	2,642	
As percentage of all private schools	77.7	74.3	72.4	56.2	49.8	69.2	
Subsidized teachers[b]							
Number	11,811	12,066	7,825	8,650	8,268	—	
As percentage of all private school teachers	91.1	79.0	50.5	46.4	41.1	—	
Number of subsidized schools, by province			*1993 = 100*				*Percent*
Antananarivo	100	107	100	72	76	116	58 (63)
Antsiranana	100	97	97	79	70	86	2 (2)
Fianarantsoa	100	100	88	81	78	100	22 (19)
Mahajanga	100	103	89	107	101	108	4 (4)
Toamasina	100	96	88	235	138	105	6 (4)
Toliara	100	104	99	71	48	82	7 (8)
Total	100	104	96	83	78	108	100 (100)
Number of subsidized teachers, by province			*1993 = 100*				*Percent*
Antananarivo	100	104	65	77	77	—	55.9
Antsiranana	100	97	62	54	56	—	5.0
Fianarantsoa	100	103	71	70	64	—	16.8
Mahajanga	100	99	72	89	69	—	7.0
Toamasina	100	98	68	66	68	—	7.6
Toliara	100	98	59	65	44	—	7.5
Total	100	102	66	73	70	—	100.0

— Not available.
Note: Data for 1998 are not available.
a. Refers to the average for 1993–99 for the distribution of schools and to 1993–97 for that of teachers. Figures in parentheses refer to the distribution of all private schools offering primary and secondary education, whether subsidized or not.
b. Includes private school teachers in primary and secondary education.
Source: Based on data from the MINESEB.

the management of the public system, particularly as regards staff deployment across schools, school mapping in light of economies of scale in service delivery, and student learning outcomes. The management of public subsidization of private schools is set aside for exploration elsewhere in order to keep the scope of the study within manageable limits.

Teacher Allocation, Redeployment, and Recruitment

Teachers represent the bulk of the resources that schools, especially at the lower levels, are given to organize the delivery of education services. Their deployment therefore provides a good idea of how aggregate resources for education are distributed across schools in the system.[3] Of particular interest is the relation between the number of teachers that a school is allocated and the number of pupils it enrolls. How consistent and how equitable is the allocation? Does the pattern differ for public and private schools? What are the similarities and dissimilarities with the patterns in other low-income countries? What has been the recent experience with efforts to improve the overall allocation of teachers through staff redeployment and recruitment?

Overall patterns of deployment as reflected in pupil-teacher ratios

Table 5.7 shows the relevant data on staff deployment by level of education and province, with the averages computed from school-level ratios. Consider first the data for primary schools. In the public sector the average ratio for rural schools exceeds that for urban schools, implying that rural schools are more likely than urban schools to operate with inadequate allocations of teachers. This pattern is surprising because urban schools should be in a better position than rural schools to take advantage of scale economies in service delivery and therefore to operate with higher ratios of students to teachers. Across provinces, rural schools in Antsiranana and Toamasina have strikingly high ratios—77 and 74, respectively, certainly well above the ratios for effective teaching and learning. Private schools generally operate with smaller ratios than public schools, averaging 46 students per teacher versus 59 pupils per teacher in public schools, but as in the public system, urban schools tend to be better endowed than rural schools. Across provinces, the pupil-teacher ratio is exceptionally high in private schools in rural Fianarantsoa. In both the public and private sectors, schools in the city of Antananarivo have a consistently better allocation of teachers than other urban schools.

With regard to secondary education, it is interesting to note the reversal in patterns for urban and rural schools in the public and private sectors. In contrast to the pattern at the primary level, the average student-teacher ratio for urban lower secondary schools exceeds that for rural schools, and the ratios for both upper and lower secondary private schools generally exceed the corresponding ratios for public schools. The ratios for lower secondary schools are much higher than the ratios for upper secondary schools in both the public and private sectors. At the lower secondary level the ratio for the city of Antananarivo is the lowest among urban localities—17.6 students per teacher, only about half as high as the ratio for urban schools in Toamasina, the province with the highest student-teacher ratio in the public sector. In the private sector, schools in the city of Antananarivo continue to be favorably endowed, but the gap across localities is smaller. The highest student-teacher ratios, for both lower and upper secondary education, are found in Toamasina.

Relating teacher allocation to the size of enrollments across schools

The disparities in student-teacher ratios described above provide a first clue to possible inconsistencies in teacher allocation across schools. In the public sector we would expect schools of the same size to be allocated more or less the same number of teachers. Such an allocation yardstick would ensure that the bulk of public spending is distributed equitably and consistently across schools. In the private sector, market forces determine service delivery more directly, so the number of teachers on staff may vary in schools of similar size, depending on the local clientele's willingness and ability to pay for the extra teachers. In this section we examine the allocation of teachers across schools, concentrating on the public sector and drawing comparisons with the private sector as needed. The reason for this focus is that the government, as a direct manager of service delivery in the public system, can and should enhance the system's efficiency through better management of teacher deployment across schools.

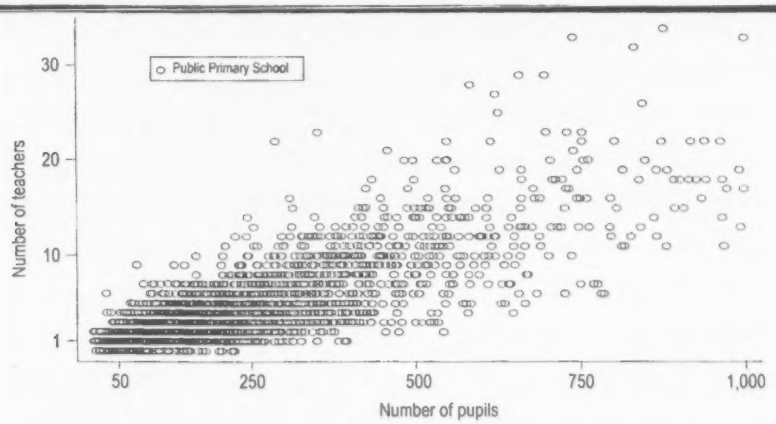
Table 5.7
Student-Teacher Ratios in Primary and Secondary Schools by Sector and Locality, Madagascar, 1998

Cycle of schooling, sector, and locality	Student-teacher ratios, averaged across schools[a]							
	All provinces	Antananarivo		Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
		City	Province					
PRIMARY								
Public								
Urban	51.0	40.1	46.6	57.2	44.1	47.1	65.8	45.2
Rural	60.2	..	55.7	77.4	53.9	55.2	73.9	48.0
Overall	59.0	..	54.5	75.7	52.8	54.4	72.7	47.5
Private								
Urban	33.7	27.6	32.2	33.3	33.8	38.8	33.1	37.7
Rural	50.3	..	46.4	50.8	64.8	40.7	52.1	40.4
Overall	46.1	..	43.1	38.2	60.7	39.2	39.5	39.6
LOWER SECONDARY								
Public								
Urban	21.8	17.6	21.1	26.2	19.0	18.5	33.2	16.1
Rural	15.1	..	17.8	11.7	14.3	7.8	18.5	9 8
Overall	16.4	..	18.5	14.0	15.0	12.9	21.2	11.6
Private								
Urban	26.9	24.3	24.3	24.4	31.0	27.8	34.6	26.0
Rural	18.6	..	18.4	30.6	19.5	14.4	19.3	12.5
Overall	23.4	..	21.2	26.7	26.8	27.1	32.6	23.8
UPPER SECONDARY								
Public, overall	9.1	13.9	10.8	9.8	12.8	7.2	6.3	6.4
Private, overall	12.9	11.1	10.9	11.3	20.2	10.1	28.5	8.3

.. Not applicable.
a. Note that because the averages are computed using schools as units of observation, the student-teacher ratios in this table differ from those in Chapter 3, where the ratios are computed by simply dividing the total number of students by the total number of teachers.
Source: MINESEB 1997–98 school census.

Primary schools. Figure 5.1 illustrates the relation between teacher allocation and school size for public primary schools for 1998. Note that some schools had no publicly paid teachers allocated to them. Indeed, in 295 of the approximately 9,100 public primary schools the only teachers available were those paid by FRAM, the school-based parent-teacher association, while in 842 schools such teachers supplemented an inadequate allocation of publicly paid teachers. Teachers paid by FRAM made up about 5 percent of the total complement of teachers working in public primary schools. The figure shows that while the number of teachers that a school receives tends to rise with enrollments, the

Figure 5.1
Relation between Number of Publicly Paid Teachers and Number of Pupils, All Public Primary Schools, Madagascar, 1998



Note: For some schools, the figure shows fewer than one teacher because all the school's teachers are paid by FRAM, the school-based parent-teacher association.
Source: MINESEB 1997–98 school census.

Table 5.8
Provincial Regression Estimates of the Relation between Numbers of Teachers and Pupils, Primary Schools, Madagascar, 1998

	All Madagascar			Public primary schools only						
	Public schools			Antananarivo						
	Model 1	Model 2	Private schools	City	Province	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
Intercept	–0.09 (2.14)*	–0.11 (2.02)*	0.62 (9.21)**	2.23 (3.75)**	–0.44 (6.80)**	–0.08 –0.77	–0.09 –0.86	0.31 (3.31)**	–0.37 (4.46)**	0.30 (3.97)**
Number of pupils	0.019 (55.57)**	0.020 (59.75)**	0.023 (35.83)**	0.021 (17.30)**	0.022 (43.61)**	0.012 (19.65)**	0.023 (23.24)**	0.018 (24.17)**	0.018 (26.15)**	0.021 (29.96)**
Provincial dummy variables[a]	No	Yes	No							
R^2	0.72	0.75	0.66	0.87	0.80	0.67	0.74	0.83	0.69	0.84
Number of schools	9,158	9,158	2,932	86	2,331	642	2,609	531	2,115	930

* Statistically significant at 5 percent.
** Statistically significant at 1 percent.
Note: Numbers in parentheses are robust *t*-statistics.
a. See Appendix table A5.3 for the coefficient estimates on the dummy variables used in model 2.
Source: Based on MINESEB 1997–98 school census.

variation across schools is very wide. For a primary school that enrolls 100 pupils, for example, the number of publicly paid teachers could range from none to around 7.

One simple measure of the degree of dispersion in teacher allocation is the R^2 statistic associated with the regression relating the number of teachers to the number of pupils (Table 5.8). For the whole sample of public primary schools, the value of this statistic is 0.72, which means that 28 percent of the variation across schools in the allocation of teachers is unrelated to the size of enrollments.[4] As expected, staffing patterns are much more varied across private schools, as is reflected in the R^2 value of 0.66 for the corresponding regression.

For schools in the public sector, the table shows additional regression results by province. In one regression, provincial dummy variables have been added to the basic regression equation. The corresponding R^2 value rises to 0.75, which means that after taking into account average interprovincial differences in teacher allocation, 25 percent of the variation across schools remains unrelated to the size of enrollments. By implication, of the total 28 percentage point unexplained variation in teacher allocation across schools, only 3 percentage points, or just 11 percent, can be attributed to average differences across provinces. That substantial intraprovincial variation in staffing patterns across schools exists can be seen in the R^2 values of the separate regression equations for each province, which range from a low of 0.67 in Antsiranana and 0.69 in Toamasina to a maximum of 0.87 for the city of Antananarivo.

Beyond the overall picture of inconsistency in teacher allocation across schools presented above, we can obtain a finer-grained view of the disparities by comparing each school's allocation in relation to benchmarks predicted for schools of the same size. For simplicity, the benchmarks are based on regression estimates of the relation between teacher allocation and enrollments using the specification in model 1 in Table 5.8 and the data for all schools, public and private, in order to capture systemwide practices.[5] If the difference between a school's actual complement of teachers and the predicted enrollment-based norm ($T - T^*$), rounded off to the nearest whole number, is 0, the school is considered adequately staffed in relation to the norm. If there is a difference and it is positive, the school is judged to be overstaffed; if there is a negative difference, the school is considered understaffed. Applying this procedure allows us to assess the distribution of schools across localities in terms of their relative endowment of teaching staff. The results for schools in the public system appear in Table 5.9.

Overall, the results are consistent with those presented above in that substantial inconsistency in staffing across schools exists within provinces. For Madagascar as a whole, 37 percent of the public primary schools are understaffed in relation to systemwide enrollment-based norms, while 24 percent are overstaffed. Understaffing is more of a problem in rural schools than in urban schools. In the city of Antananarivo, 78 percent of the city's 86 schools exceed nationwide staffing norms, and only 13 percent are understaffed. Across provinces, schools in Antsiranana are most likely to be understaffed, the share reaching an astonishing 62 percent. In Toamasina 54 percent of schools are understaffed. In the other provinces the share of understaffed schools ranges between 21 and 32 percent.

At some schools affected by understaffing, the local parent-teacher association (FRAM) responds to the problem by hiring teachers on its own, defraying the costs through fees paid by pupils' families. The last column of Table 5.9 shows the distribution of FRAM-paid teachers by locality. As expected, most of these teachers work in rural schools, where the deficit in teachers is more prevalent. They are also concentrated in three provinces: Antananarivo, Antsiranana, and Toamasina. The concentration in the last two provinces is consistent with the high proportion of understaffed schools there. In Antananarivo the share of understaffed schools is moderate, 32 percent, but the province is the richest and most modernized in the country, and parents are more willing and more able to pay for the extra teachers. In contrast, in Mahajanga, where the level of understaffing is similar to that in Antananarivo, hardly any school has hired FRAM-paid teachers.

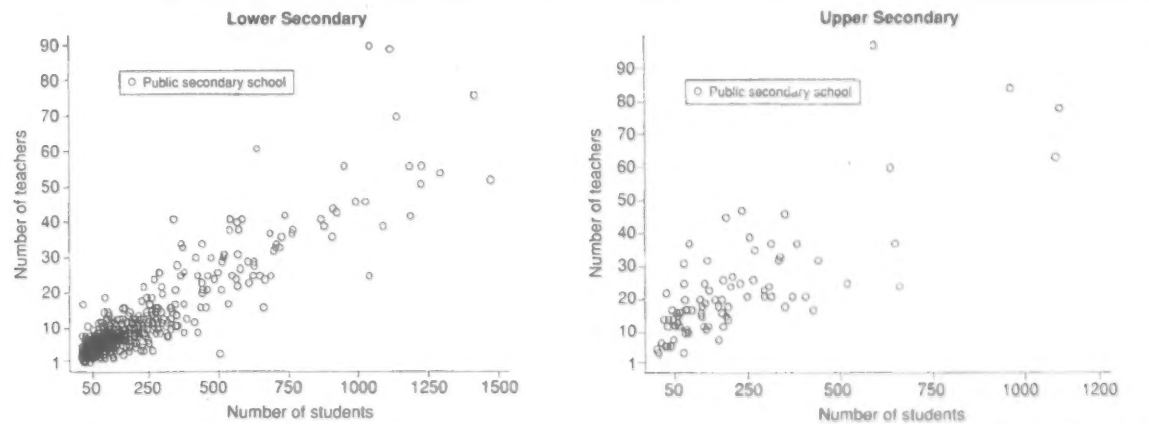
Secondary schools. We turn now to the pattern of teacher deployment in public secondary schools. As Figure 5.2 shows, the relation between teacher allo-

Table 5.9
Distribution of Public Primary Schools according to Adequacy of Teacher Complements, Madagascar, 1998

Area	Total number of schools	Percentage distribution of schools[a]				Percentage of FRAM-paid teachers (total number: 1,433)
		Adequately staffed	Overstaffed	Understaffed	All schools	
Madagascar	9,158	39	24	37	100	100
Urban areas	1,219	29	43	28	100	8.3
Rural areas	7,939	41	22	38	100	91.7
City of Antananarivo	86	9	78	13	100	..
Antananarivo Province (excluding city)	2,331	39	29	32	100	50.0
Antsiranana	642	24	13	62	100	34.8
Fianarantsoa	2,609	43	30	27	100	3.1
Mahajanga	531	41	27	32	100	1.7
Toamasina	2,115	36	11	54	100	10.5
Toliara	930	45	35	21	100	0.0

.. Not applicable.
a. Schools are evaluated in relation to staffing norms predicted from a regression equation based on data for the whole population of public and private schools in which the number of staff (the dependent variable) is expressed as a function of the number of students. A school is adequately staffed if the difference between the actual number of staff and that predicted for a school of the same size, rounded off to the nearest whole number, is zero; it is overstaffed if the difference exceeds zero and is understaffed if the difference falls below zero.
Source: Based on data from MINESEB 1997–98 school census; see Appendix table A5.5 for further details.

Figure 5.2
Relation between Numbers of Teachers and Pupils, Public Secondary Schools, Madagascar, 1998



Source: MINESEB 1997–98 school census.

cation and school size is highly inconsistent. Among lower secondary schools, for example, those serving 200 to 250 students could have anywhere from 4 to 22 teachers allocated to them.

Following the same procedure as for the primary school sample, we begin by relating the number of teachers to the number of students across public secondary schools and again use the R^2 statistic as a measure of consistency in staff allocation. The results appear in Table 5.10. Overall, the allocation of teachers follows student enrollments more closely than at the primary level, with an R^2 of 0.87 at both the upper and lower secondary levels, compared with 0.72 at the primary level. Adding provincial dummy variables to the regression hardly reduces the inconsistency in teacher allocation, implying that almost all the discrepancy in teacher allocation occurs within each province. The share of variation in teacher allocation that is unrelated to enrollments ranges from only 6 percent in Mahajanga (which has the smallest lower secondary school system, with only 21 schools) to 17 percent in Toliara. As in primary education, the allocation of teachers across private schools is more diverse, with the R^2 value falling from 0.46 for lower secondary schools to only 0.26 at the upper secondary level.

Table 5.10
Regression Estimates of the Relation between Numbers of Teachers and Students in Public Secondary Schools, Madagascar, 1998

		R^2 values of regression equation	
Sample	Regressors	Lower secondary	Upper secondary[a]
Madagascar	Number of students[b]	0.87 (0.46)	0.87 (0.26)
	Number of students + provincial dummies	0.87	0.89
Province	Number of students		
Antananarivo		..	0.89
Antsiranana		..	0.89
Fianarantsoa		..	0.85
Mahajanga		..	0.94
Toamasina		..	0.89
Toliara		..	0.83

.. Not applicable.
Note: For the full regression results, see Appendix tables A5.3 and A5.4.
a. Because of the small number of upper secondary schools (a total of 91), the provincial regressions are not repeated for this level.
b. Figures in parentheses refer to the R^2 values for regressions using the sample of private schools only.
Source: Based on MINESEB 1997–98 school census.

As before, each school can be characterized according to the adequacy of its complement of teachers relative to the systemwide norm for schools of the same size. The results, aggregated across localities, appear in Table 5.11. As at the primary level, the large shares of overendowed and deficit schools suggest substantial inconsistency in staffing across schools at both the lower secondary and upper secondary levels. For the country as a whole, about a third of the lower secondary schools are understaffed, and 51 percent are overstaffed. As before, understaffing affects schools in rural areas to a greater extent than those in urban areas. In the city of Antananarivo, understaffed lower secondary schools make up only 7 percent of all the schools in the city, whereas for the rest of the province that share is 41 percent.[6] Across provinces, the results for Antsiranana are especially striking. Recall that the province had the largest shortfall in staffing in its primary schools. For secondary schools the pattern is completely reversed: the province has one of the smallest shares of understaffed secondary schools (at both levels), as well as one of the largest shares of overstaffed schools. The pattern suggests possible misallocation of staff across levels of schooling within the province.

Improving teacher allocation through redeployment and new recruitment

Faced with widening disparities in staffing, both across and within provinces, and in view of the hiring freeze in place at the time, the government decided in 1997 on a plan for staff redeployment.[7] The aim of the plan was to reassign both teachers and nonteaching staff to ease the shortages in personnel that many schools, especially those in rural areas, were experiencing and to staff schools that had closed but whose reopening could be justified. To facilitate teacher reassignment to schools in remote areas, the plan was reinforced by such

Table 5.11
Distribution of Public Secondary Schools According to Staffing Patterns, Madagascar, 1998

Cycle of schooling and locality	Number of schools	Percentage distribution			
		Adequately staffed	Overstaffed	Understaffed	Total
LOWER SECONDARY					
Madagascar	608	16	51	34	100
Urban areas	123	7	65	28	100
Rural areas	485	18	47	35	100
City of Antananarivo	14	0	93	7	100
Antananarivo	181	13	46	41	100
Antsiranana	58	9	76	16	100
Fianarantsoa	151	21	46	33	100
Mahajanga	21	24	57	19	100
Toamasina	111	18	36	46	100
Toliara	86	13	70	17	100
UPPER SECONDARY					
Madagascar	91	3	58	38	100
Antananarivo	24	0	63	38	100
Antsiranana	8	13	63	25	100
Fianarantsoa	17	0	29	71	100
Mahajanga	10	10	50	40	100
Toamasina	17	6	71	24	100
Toliara	15	0	73	27	100

Source: Based on MINESEB 1997–98 school census; see Appendix table A5.6 for further details.

measures as an increase in the salary supplement for rural postings and the establishment of pay stations closer to teachers' duty posts. During the school years 1997–98 and 1998–99, close to 5,000 primary school teachers and almost 1,000 secondary school teachers were redeployed, and a little more than 400 schools were reopened. Meanwhile, in 1997 the long-standing freeze on teacher recruitment was lifted, enabling the government to hire about a thousand teachers in 1997–98 and again in 1999–2000 (Table 5.12), for a total of some 2,000 new teachers. Below, we examine the extent to which these staffing exercises have helped improve the pattern of teacher allocation across public schools.

Primary school teachers. To make the assessment, we need first to establish the baseline pattern of staffing in 1997–98. As before, we evaluate the adequacy of teacher allocation in relation to benchmarks predicted for schools of the same size on the basis of regression estimates of the relation between the number of teachers and the number of pupils.[8] The difference between the actual and predicted

Table 5.12
Staff Redeployment and Recruitment, Madagascar, 1997–2000

Level	Number of staff redeployed						Number of teachers recruited	
	1997–98			1998–99				
	Teachers	Administrative staff	Total	Teachers	Administrative staff	Total	1997–98	1999–2000
Primary	2,764	248	3,012	2,064	156	2,220	900	1,000
Lower secondary	307	224	531	535	127	662	100	0
Upper secondary	74	96	170	54	57	111		0
All levels	3,145	568	3,713	2,653	340	2,993	1,000	1,000

Source: MINESEB

numbers of teachers, rounded off to the nearest whole number, would indicate a school's shortfall or surplus in teacher allocation, reflecting probable constraints and slack in staffing across schools in 1997–98. To what extent do the recent rounds of teacher redeployment and recruitment respond to those constraints?

The relevant data aggregated by province appear in Table 5.13. Consider first the pattern of surpluses and deficits across provinces. An effective redeployment exercise would in principle redistribute teachers from overendowed schools to those with a shortfall. For the exercises of 1997–98 and 1998–99, the available information pertains to the number of teachers in each province who were redeployed; no information is available on the destination to which they were assigned. Nonetheless, even the limited information that is available can be used to make a tentative assessment of the redeployment efforts so far.

Consistent with the overall level of pupil-teacher ratios presented earlier, Table 5.13 identifies Antsir-

Table 5.13
Teacher Surpluses, Deficits, Redeployment, and Recruitment in Public Primary Schools, Madagascar, Late 1990s

Province	Number of teachers relative to enrollment-based norms[a]			Number of teachers redeployed			Number of teachers recruited		
	Surplus	Deficit	Net surplus	1997–98	1998–99	Total	1997–98	1999–2000	Total
Antananarivo	1,237	1,078	159	36	68	104	158	145	303
Antsiranana	120	863	–743	142	121	263	102	89	191
Fianarantsoa	1,319	917	402	1,533	807	2,340	204	270	474
Mahajanga	231	275	–44	343	360	703	166	110	276
Toamasina	454	1,839	–1,385	166	273	439	154	277	431
Toliara	515	250	265	544	435	979	116	109	225
All provinces	3,876	5,222	–1,346	2,764	2,064	4,828	900	1,000	1,900

a. For each school, the staffing norm for schools of its size is predicted from a regression equation based on data for the whole population of public and private schools in which the number of staff (the dependent variable) is expressed as a function of the number of students. The difference between the actual number of staff and the predicted norm, rounded off to the nearest whole number, provides the desired count of surplus or deficit teachers for each school. The results shown here represent the count aggregated across all schools in each province.

Source: Surpluses and deficits of teachers estimated on the basis of data from MINESEB 1997–98 school census; data on teacher redeployment and recruitment supplied directly by the MINESEB.

anana and Toamasina as the least well endowed in terms of teacher allocation. Because of inconsistency in staffing across schools within each province, these net surpluses hide the fact that in each province some schools have a surplus of teachers in relation to enrollment-based norms, while others have a shortfall.

Set against this pattern of teacher surpluses, the most striking feature of the redeployment efforts so far is the very small number of teachers in Antananarivo who have been remapped, not only in comparison with the movement of staff in the other provinces but also in view of the magnitude of the slack in teacher allocation across schools within the province itself. In contrast, large movements of staff across schools appear to have taken place in many other provinces, often well beyond the corresponding estimates of surplus teachers. In Fianarantsoa, for example, a cumulative total of 2,340 teachers was redeployed, compared with the surplus of 1,319, and in Antsiranana where the surplus was only 120 teachers, the number of redeployed teachers came to a cumulative total of 263.

These results, particularly those for Antananarivo, illustrate well the difficulty of implementing teacher redeployment policies, given the current provisions in the civil service statute that allow spouses of civil servants to take up teaching positions in schools located in the spouses' place of employment even if these schools already have a surplus of teachers. It was precisely to counteract the perverse results of this provision in the statute that the MINESEB recently put in place the *gestion par poste budgétaire* system whereby teaching positions are allocated to schools rather than to individuals, implying that teachers who leave their posts risk unemployment unless a position is available at a school in the desired location. The hope is that this new system will prevent teachers initially hired to staff rural schools from migrating to already overendowed urban schools once their probationary period of employment is over.

Consider next the findings pertaining to teacher recruitment. In an effective plan of recruitment, one would expect to see new recruits assigned mostly to schools with a shortfall of teachers. The data in Table 5.13 bear out this expectation, but only to a limited extent. Thus, while Toamasina, the province with the highest net deficit of teachers, did receive a sizable share of the new teacher recruits, particularly in the 1999–2000 round of recruitment, the same cannot be said of Antsiranana, the province with the second-highest net deficit. The bias in favor of Antananarivo is again evident in the fact that although the province had a net surplus of teachers, it received additional teachers in both rounds of recruitment. The chief beneficiary of teacher recruitment has been Fianarantsoa, which received an allocation of 474 teachers even though it had a sizable surplus.

The aggregate patterns across provinces find support in more detailed analysis at the school level. Table 5.14 shows the probability that a school received at least one of the new teachers

Table 5.14
Predicted Probability of Receiving at Least One of the Primary School Teachers Recruited during 1997–2000 in Relation to Adequacy of Staffing in 1997–98, Madagascar

Type of school according to adequacy of staffing in 1997–98[a]	Overall probability	Extent of shortfall or surplus				
		1 teacher	2 teachers	3 or more teachers	3 teachers	4 or more teachers
Understaffed	13.5*	11.7*	14.9*	35.4*	..	..
Overstaffed	8.7	9.5	6.3	..	8.5	4.4*
Adequately staffed	8.9	..	..	..	..	..

* Statistically significant at the 1 percent level. No other estimates are significant at the 5 percent level or better.
.. Not applicable.
a. Schools are evaluated in relation to staffing norms predicted from a regression equation based on data for the whole population of public and private schools in which the number of staff (the dependent variable) is expressed as a function of the number of students. A school is adequately staffed if the difference between the actual number of staff and that predicted for a school of the same size, rounded off to the nearest whole number, is zero; it is overstaffed if the difference exceeds zero and understaffed if the difference falls below zero.
Source: Based on the regression estimates in Table AS.7.

hired during the last two recruitment exercises, given its allocation of teachers relative to the norms predicted for schools of the same size.[9] Overall, a deficit school has a better chance of receiving at least one of the newly recruited teachers than other schools: 13.5 percent compared with 8.7 percent for schools with a surplus of teachers and 8.9 percent for schools with neither a deficit nor a surplus. Moreover, the probability rises with the depth of the deficit, reaching 35.4 percent for schools short of the predicted staffing norm by two or more teachers. This positive pattern shows that in general the allocation of new teachers has tended to benefit schools with a deficit of teachers.

Yet if we turn to the results for the surplus schools, it is clear that their chances of obtaining a new teacher are not as low as one might expect. The fact that all the regression coefficients on the surplus schools are statistically insignificant, except for schools with a surplus of four or more teachers, implies that most of the surplus schools enjoyed the same probability of receiving a new teacher as schools with neither a deficit nor a surplus of teachers. It is only when the surplus reaches exceptional levels—four or more beyond the norm—that the probability falls appreciably.

Secondary school teachers. The number of secondary school teachers redeployed or recruited is far smaller than the numbers involved at the primary level. Cumulative totals of 842 teachers in lower secondary schools and 128 teachers in upper secondary schools were redeployed during 1997–2000; 7 new teachers were recruited for lower secondary schools and 76 for upper secondary schools. We focus here only on redeployment of lower secondary school teachers.

We use the same method as before to evaluate the adequacy of staffing relative to the norms predicted from regression estimates of the relation between number of teachers and number of students, based on the data for all schools in the system. The results, aggregated by province, appear in Table 5.15, along with the corresponding data on the number of staff redeployed in the exercises of 1997–98 and 1998–99. In all provinces except Toamasina the number of surplus teachers exceeds the shortfall, implying that a movement of staff within each province should in principle be adequate to bring all schools up to national enrollment-based norms. The number of teachers redeployed exceeds the number of surplus teachers only in Fianarantsoa and Mahajanga, but in the absence of information on the destinations of the

Table 5.15
Teacher Surpluses, Deficits, and Redeployment in Public Lower Secondary Schools, Madagascar, Late 1990s

	Number of teachers relative to enrollment-based norms[a]			Number of teachers redeployed		
Province	Surplus	Deficit	Net surplus	1997–98	1998–99	Total
Antananarivo	593	175	418	15	30	45
Antsiranana	130	51	79	10	36	46
Fianarantsoa	190	102	88	146	322	468
Mahajanga	44	9	35	51	38	89
Toamasina	126	161	–35	13	38	51
Toliara	249	29	220	72	71	143
Total	1,332	527	805	307	535	842

a. Surpluses and deficits are summed across all public schools in the province; for each school the surplus or deficit is calculated as the difference (rounded off to the nearest whole number) between the actual number of teachers and the number predicted from a regression relating the two variables and based on data for all schools in the system.
Source: MINESEB.

redeployed teachers, it is impossible to assess the extent to which the redeployment has helped reduce the shortfall of teachers in the deficit schools. As at the primary level, the volume of redeployment in Antananarivo is modest, particularly in light of the large surplus of teachers in the province.

Policy challenges in managing the allocation of teachers. Because teachers are the main channel through which public resources flow to individual schools, their allocation across schools warrants close management to ensure equity and effective service delivery. Taken as a whole, the results presented above regarding teacher deployment, redeployment, and recruitment in both primary and secondary education suggest that there remains scope for improvement, especially at the primary level, where many schools in rural areas operate with inadequate complements of teachers even while schools in urban areas enjoy a surplus. In the government's current poverty reduction strategy, approximately 3,500 new primary school teachers are expected to be hired in fiscal 2001 (about a 10 percent increase in the teaching force in public schools), with more hiring expected in future years. This prospect presents a unique opportunity to reduce the current inconsistency in staffing across schools through targeted deployment of the new recruits to rural areas, combined with strict implementation of the new system of *gestion par poste budgétaire* to ensure that rural schools continue to be adequately staffed. The placement of the new teachers could therefore benefit from close management attention in the coming years.

At the same time, efforts at redeployment may need to continue, given the magnitude of the problem. The task will not be easy in light of incumbent teachers' understandable reluctance to accept postings in rural areas (where most of the deficit schools are located), especially when the current financial incentives for such postings are so small. Teachers working in the most remote rural areas, for example, receive a monthly salary supplement of FMG 40,000 (about US$7). The supplement is equivalent to about 14 percent of a primary school teacher's base pay, or only 0.8 percent of total pay including benefits. An increase in the supplement could help ease redeployment efforts while also enhancing the effectiveness of the *gestion par poste budgétaire* system for posting new teacher recruits. Designing an appropriate incentive structure would qualify as a key domain for policy development aimed at improving the allocation of teachers across schools.

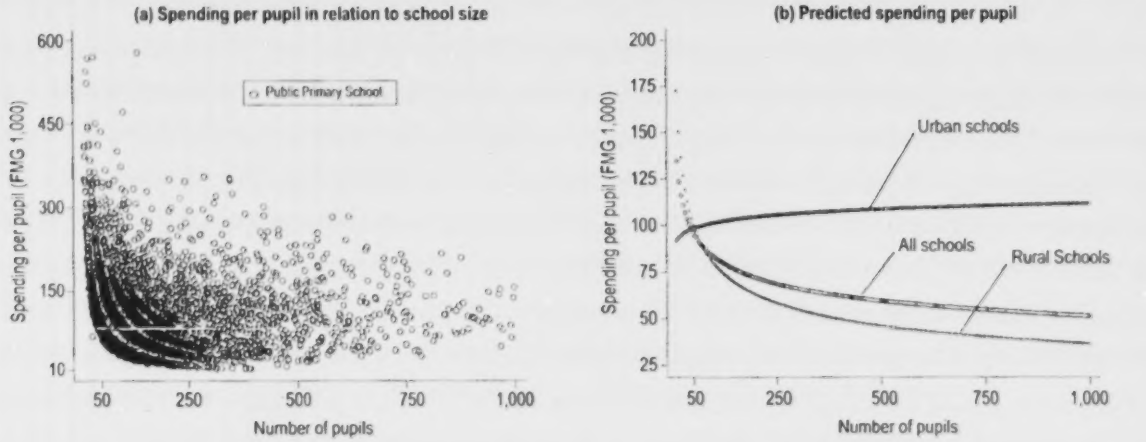
Economies of Scale in Service Delivery

Larger schools can operate at lower cost per pupil because they can more easily rationalize their teaching arrangements and can spread certain fixed costs, particularly those of administrative and other support staff, over a larger school population. In this section we examine the patterns of economies of scale in both primary and secondary schooling and evaluate their implications for cost management in the system. The cost data pertain to public schools only and are based on the 1997–98 census of schools, in which data on the number of teachers and other personnel and their distribution by salary grade are combined with information on the pay scale (and benefits) to estimate total public spending on personnel at each school. Spending on staff represents the bulk of the public resources that primary schools receive, and for secondary schools it amounts to a sizable share. Because the pay scale takes into account teacher qualifications, the estimates of spending capture the distribution of teachers by qualification across schools, allowing the analysis to go beyond the simple count of teachers across schools presented in the preceding section.

Primary education

Figure 5.3 shows the relation between spending per pupil and school size; panel (a) is simply a plot of the raw data, and panel (b) is a plot based on the unit costs predicted from a regression linking the two variables (see Appendix table A5.8). Given the disparities in teacher allocation documented earlier, the wide disparities across schools shown in panel (a) are hardly surprising. The general pattern in which unit costs fall as enrollments rise is confirmed in the regression estimates, suggesting the existence of economies of scale.[10] Noteworthy in

Figure 5.3
Relation between Spending Per Pupil and School Size, Public Primary Schools, Madagascar, 1997–98



Source: Based on MINESEB 1997–98 school census and Appendix table A5.8.

panel (b) is that only schools in rural areas take advantage of such economies and that their costs per pupil are substantially smaller than those in urban schools once enrollments exceed about 50 pupils. For example, rural schools serving 200 pupils cost only 60 percent as much as urban schools of similar size. The pattern confirms once again the strong urban bias in current patterns of resource allocation across public primary schools and calls for explicit measures to avoid reinforcing it as the government implements its current and prospective plans for teacher recruitment and deployment.

The existence of scale economies suggests two cost management actions. The first is to examine the scope for consolidating small schools, particularly those that now have fewer than 75 pupils and whose enrollments are unlikely to expand much in the foreseeable future, given conditions in the catchment area. The second is to explore the use of multigrade teaching arrangements in the small schools. Table 5.16 presents some relevant data for evaluating these potential sources of cost savings.

More than 30 percent of the country's public primary schools enroll no more than 75 pupils, and nearly 14 percent enroll 50 or fewer, implying that a significant number of schools in the system have too few pupils to take advantage of scale economies. Given the sparseness of Madagascar's population, the prevalence of small schools is undoubtedly an outcome of the government's commitment to ensure that primary schools are physically accessible to children in all of the country's approximately 11,000 *fokotanys*. In the private sector (which has only a somewhat smaller share of its schools in rural areas) small operations are even more common, with 27 percent of the schools having 50 or fewer pupils and 47 having up to 75 pupils. But an important feature of private schools is that the small enrollments are often attached to other sections that offer instruction at the secondary level, an arrangement that would obviously allow some economies of scope to materialize, as least in terms of administrative overhead.

Further comparison suggests that small private schools rely on multigrade teaching more than do small public schools (more than 90 percent among private schools enrolling 75 pupils or fewer do so, compared with 70 percent in the public sector). Moreover, under the generic label of multigrade teaching, there are indications that teaching arrangements differ substantially between the public and private sectors: only 33 to 35 percent of the small public schools offer full-day instruction,

Table 5.16
Size Distribution of Primary Schools and Teaching Arrangements in the Public and Private Sectors, Madagascar, 1998

	Public schools			Private schools		
		Percentage of schools			Percentage of schools	
School size	Distribution by size (percent)	Using multigrade teaching	Offering full-day instruction[a]	Distribution by size (percent)	Using multigrade teaching	Offering full-day instruction[a]
<50	13.9	69.9	32.7	26.6	90.9	69.0
51–75	17.6	69.8	35.4	20.7	91.1	74.2
76–100	15.4	70.9	37.4	13.9	87.7	77.7
101–125	13.6	70.7	44.5	9.0	87.2	82.4
>125	39.5	47.9	57.4	29.9	36.2	86.9
Total share[b]	100.0	61.5	43.5	100.0	73.8	75.8
Total number of schools	9,159			2,933		

a. Full-day instructon means at least 6 hours in a school day.
b. Includes the primary school section in private schools that offer other levels of instruction.
Source: Based on MINESEB 1997–98 school census.

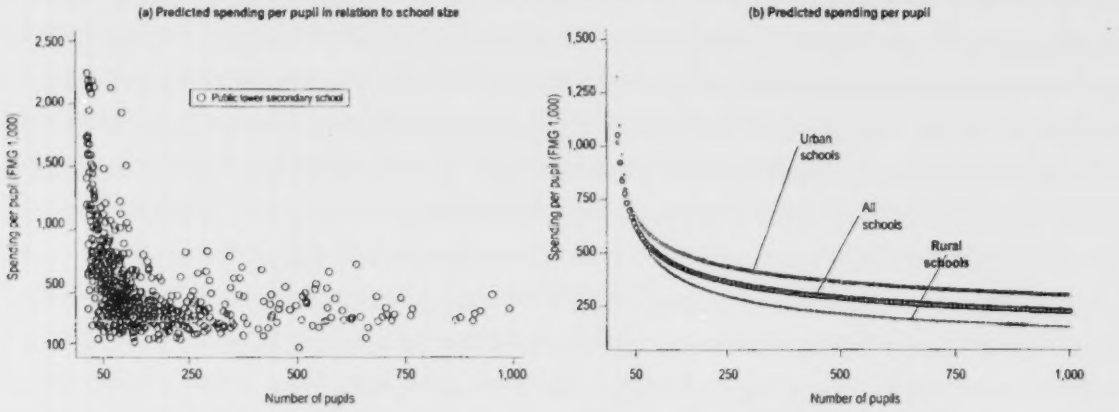
compared with nearly 69 to 74 percent for private schools of comparable size.[11]

Ideally, children in multigrade classes should receive the same hours of instruction as other children. But achieving this result would require combining pupils from different (usually contiguous) grade levels in the same room at the same time, with the teacher managing the pedagogical process by forming smaller groups within the class and rotating among them to provide appropriate lessons to the groups. This approach has been used successfully in many low-income countries, with surprisingly positive effects on student learning when implemented well.[12] Part of the positive impact comes about because the arrangement encourages the teacher to focus explicitly on the diverse learning needs of children in the class and to respond more deliberately to those needs; at the same time, it offers children some opportunity to engage in supervised independent work and peer tutoring, both of which reinforce a child's acquisition of skills. It appears from the available data, however, that most of the small public schools follow arrangements for multigrade teaching in which the teacher gives lessons to separate groups of grade-specific children in sequential 1 to 2 hour blocks of time. How much the arrangement is a response to such factors as constraints in physical facilities and lack of training in multigrade teaching is unclear from the available data. There is no doubt, however, about the outcome: the time available for learning is compromised, particularly for children in remote rural schools.

Secondary education

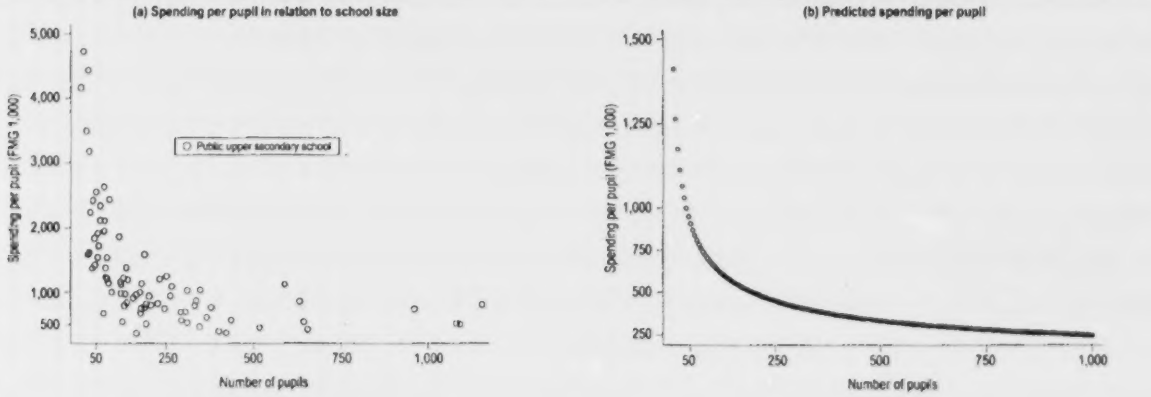
Figure 5.4 shows the relation between school size and spending per student on teaching and nonteaching staff for lower secondary public schools; Figure 5.5 does the same for upper secondary public schools. As in Figure 5.3, panel (a) in each figure is a simple plot of the raw data and panel (b) is a regression-based simulation of the relation between the two variables.[13] The by now familiar pattern of wide disparities in spending per student across schools is repeated here, reinforcing the perception of poor allocation of staff across schools. Economies of scale are more sizable than in primary schooling: on aver-

Figure 5.4
Relation between Spending Per Student and School Size, Public Lower Secondary Schools, Madagascar, 1997–98



Source: Based on MINESEB 1997–98 school census and Appendix table A5.8.

Figure 5.5
Relation between Spending Per Student and School Size, Public Upper Secondary Schools, Madagascar, 1997–98



Source: Based on MINESEB 1997–98 school census and Appendix table A5.8.

age, a 10.0 percent increase in lower secondary school enrollments raises total spending on personnel by 6.7 percent in the lower secondary cycle and by 5.7 percent in the upper secondary cycle, compared with an average of 7.9 percent in the primary cycle—patterns that no doubt reflect the heavier use of administrative and other support staff in secondary education. As at the primary level, lower secondary schools in urban areas take advantage of scale economies to a smaller extent than do schools in rural areas, again reflecting the urban bias in staff deployment. In both lower and upper secondary education the minimum economic size of enrollments appears to be around 250 students.

These results suggest at least two directions for further exploration and policy development: (a) the size distribution of schools and its implications for school consolidation and related student finance

Table 5.17
Size Distribution of Secondary Schools, Madagascar, 1997–98
(percent, unless otherwise indicated)

	Lower secondary education		Upper secondary education	
School size	Public	Private	Public	Private
75 or less	36.8	28.4	26.4	41.3
76–125	22.7	20.0	20.9	28.3
126–250	19.1	24.0	24.2	19.0
251–400	8.4	13.5	13.2	8.2
>400	13.0	14.1	15.4	3.3
All schools	100.0	100.0	100.0	100.0
Number of schools[a]	608	504	91	184

a. A "school" in this context may be a section in a school that offers other levels of instruction.
Source: Based on MINESEB 1997–98 school census.

policies, and (b) teachers' workload and subject specialization in small schools. Some data relevant to the discussion are presented below.

Size distribution of schools. Table 5.17 suggests that many public secondary schools enroll far too few students to take advantage of scale economies: those serving no more than 75 students make up 37 percent of the schools offering lower secondary instruction and 26 percent of those offering upper secondary schooling. Small enrollments are also very common in the private sector, but as at the primary level, many schools combine multiple cycles of instruction on the same premises under a common administration to spread out the overhead costs. Thus, whereas only 3.5 percent of the public secondary schools offer both the lower and upper cycles of instruction, the share rises to 87.2 percent in the private sector, where some schools even extend the range to include primary schooling (see Table 5.1, columns 2 and 3).

Combining small sections of students—by consolidating those in the same cycle or in different cycles—is probably more practicable at the secondary than the primary level, given that students are older and more mobile. Yet school consolidation also means that more students may find secondary schooling less affordable as a result of increases in transport costs and, perhaps, the extra expense of boarding away from home. A school consolidation exercise would therefore need to be considered carefully and would have to take into account not just the current static picture of enrollments but also the likely evolution of enrollments in coming years. In some small schools projected growth over the next few years may bring total enrollments up to economic size, in which case consolidation would not be needed. In situations where enrollments will remain small even under the most favorable growth scenario, amalgamating small schools would call for serious consideration, along with policies on student finance designed to minimize the possible adverse impacts on deserving students from poor families.

Student finance. The available information on student finance pertains mainly to trends in aggregate spending and distribution of spending across provinces (Table 5.18). Public spending on student aid in secondary education rose by 16 percent in real terms between 1995 and 1999, but because MINESEB's budget grew even faster, the share allocated to student aid was actually a third smaller in 1999 than in 1995. The number of students receiving grants fell from 13,173 in 1995 (8.4 percent of the total number of public secondary students) to 6,464 in 1999 (3.7 percent). These trends imply that the value of individual grants grew by an estimated average of 75 percent during the period.

How these changes in student finance have affected students from different socioeconomic groups is not clear from the available data, but information on the provincial composition of the grants provides some clues. The most striking feature is the dramatic increase, by 360 percent between 1995 and 1999, in the number of students in Antananarivo who received a grant compared with the uniformly negative trend in all the other provinces. Antananarivo now absorbs over a fifth of all grants awarded. The heavy bias in favor of Antananarivo and the curious trends suggest that the current criteria for granting financial aid might benefit from a review to assess the scope for

Table 5.18
Government Grants for Public Secondary Education, Madagascar, 1995 and 1999

Item	Lower secondary			Upper secondary			Both levels		
	1995	1999	Percentage change, 1995–99	1995	1999	Percentage change, 1995–99	1995	1999	Percentage change, 1995–99
PUBLIC SPENDING ON STUDENT GRANTS									
Millions of current FMG	290	471	..	98	175	..	388	647	..
Millions of 1998 FMG	398	448	+13	134	167	+24	532	615	+16
As share of MINESEB current spending	0.18	0.12	–33	0.06	0.04	–33	0.24	0.16	–33
GRANTHOLDERS									
Total number	9,789	4,711	–52	3,384	1,753	–48	13,173	6,464	–51
As share of enrollments (percent)[a]	7.5	3.2	–57	12.2	5.6	–54	8.4	3.7	–56
GRANTHOLDERS, BY PROVINCE									
Antananarivo	261	1,000	+283	59	472	+700	320	1,472	+360
Antsiranana	2,700	909	–66	756	205	–73	3,456	1,114	–68
Fianarantsoa	3,113	930	–70	1,125	410	–64	4,238	1,340	–68
Mahajanga	1,495	503	–66	428	124	–71	1,923	627	–67
Toamasina	1,136	924	–19	723	336	–54	1,859	1,260	–32
Toliara	1,084	445	–59	293	206	–30	1,377	651	–53

.. Not applicable.
a. Relative to the corresponding enrollments in public secondary schools; for 1998 the number of grantholders is related to students enrolled in 1998.
Source: Based on data supplied by the MINESEB.

improving the strategic focus of student aid in the context of potential school-mapping exercises.

Teachers' workloads and subject specialization. As has been noted, because of Madagascar's sparse population, small secondary schools may be an unavoidable feature of the system, particularly in rural areas, where factors other than scale economies may influence the placement of schools. Managing the costs of such schools would essentially mean managing teachers' workloads by discouraging excessive subject specialization. What scope is there for these interventions, and what would they mean for cost reduction?

The data in Table 5.19 offer some relevant information in this regard. Teachers in public lower secondary schools average about 15 hours a week of teaching, compared with 19 hours among their private school counterparts. For teachers in the upper secondary cycle, the corresponding figures are 12 and 18 hours. These differences do have a large impact on costs: other factors being held constant, they would raise unit costs in public schools relative to those in the private sector by 28 percent at the lower secondary level and by 45 percent at the upper secondary level. One explanation for the lower teaching loads in public schools is their larger share of single-subject teachers, with a particularly large gap in upper secondary schools.

Table 5.19
Teaching Loads and Subject Specialization among Secondary School Teachers, Madagascar, 1998

Indicator	Lower secondary		Upper secondary	
	Public	Private	Public	Private
Weekly hours of classroom teaching[a]	14.9 (5.2)	19.1 (8.4)	12.5 (4.8)	18.1 (8.2)
Percentage distribution of teachers by subject specialization				
1 subject	66	55	96	71
2 subjects	27	34	4	25
3 subjects	6	11	0	5
All teachers	100	100	100	100
Number of teachers in sample	7,134	4,357	2,748	2,511

a. Figures in parentheses are the corresponding standard deviations of the means in the previous row. The means are based on slightly different numbers of teachers than those shown in the last row.
Source: Based on MINESEB 1997–98 school census.

Designing policies to take advantage of scale economies in education

That economies of scale exist in primary and secondary education is beyond doubt. They present policymakers with tough options involving tradeoffs that are not always easy to balance. Small schools, particularly in rural areas, may be the only means of delivering services to Madagascar's small, dispersed communities. Yet even in the small schools, options exist for managing their inevitably high costs. These measures include the proper application of multigrade teaching techniques and the rationalization of teaching loads by expanding teachers' capacity to teach more than one subject. In settings where a realistic assessment suggests that the prospects for rapid enrollment growth in a locality are weak, school consolidation—the pooling of students from nearby facilities that have been offering either the same or contiguous cycles of schooling—may be the most sensible option. In such situations student aid can be used strategically as part of the consolidation effort, to minimize potential adverse impacts on students from poor families.

Learning Outcomes

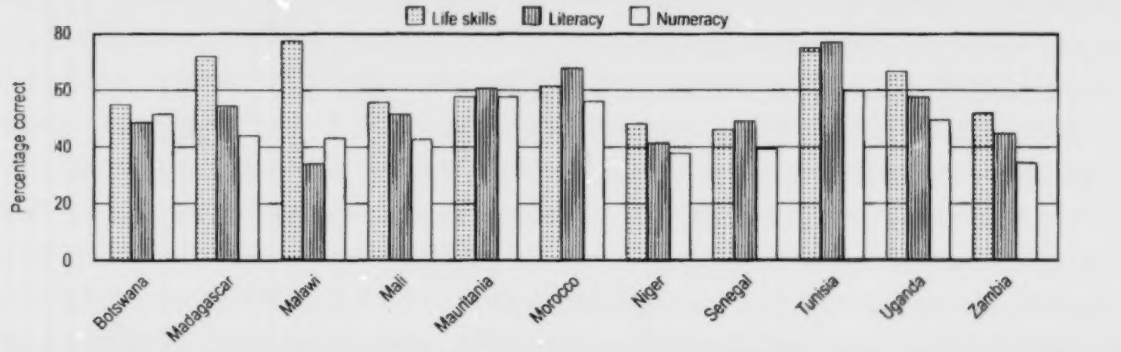
The success of an education system depends not only on how many students it enrolls but also on how much students learn. In this section we employ a diverse set of survey and administrative data to evaluate student learning in Madagascar. We focus mainly on primary education, but where the data permit, we include performance at the secondary level. After documenting student achievement in cross-country and historical perspective, we examine the correlates of student learning, compare the sources of differences in performance across public and private schools, and evaluate the relation between inputs of resources and outcomes. We use the results from internationally comparable standardized tests, as well as pass rates on national examinations, as measures of student learning, recognizing full well that they do not reflect the totality of skills that schools seek to impart to their charges.

Cross-country comparisons

We look first at the results of the 1999 Monitoring Learning Achievement (MLA) study sponsored by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 18 countries, mostly in Africa. Malagasy fourth-graders fared reasonably well among children from the 11 countries for which data are currently available.[14] Their average scores for the three areas tested—life skills, literacy, and numeracy—exceeded the sample average, with an especially notable advantage on the life skills test (Figure 5.6).[15] The results are remarkable, given that Madagascar is one of the poorer countries in the sample and that its aggregate public spending on education is relatively modest.

Madagascar's favorable ranking is consistent with the results from surveys sponsored by the Conférence des Ministres de l'Education des Pays ayant le Français en Partage (CONFEMEN) in several African countries in the mid- to late 1990s. Children in grades 2 and 5 were tested in mathematics and French at the start and end of the school year. In five countries (Burkina Faso, Cameroon, Côte

Figure 5.6
Fourth-Graders' Test Scores, Madagascar and Selected Developing Countries, 1999



Source: UNESCO (1999b); see Appendix table A5.9 for actual scores

d'Ivoire, Madagascar, and Senegal) identical tests were administered, making it possible to compare results. Malagasy children performed well, scoring above the sample averages in both subjects in grade 2 and above the sample average in mathematics in grade 5 (see Appendix table A5.10). Taken together, the data from the two international surveys place Madagascar among the countries with relatively good student learning outcomes.

Although the cross-country comparisons are favorable, the test scores are nonetheless low in absolute terms, hovering around 50 percent in both mathematics and French, which implies that pupils answered only about half the test questions correctly. Furthermore, from a global perspective, it bears repeating that because survival rates to grade 4 are modest in Madagascar (about 43 percent in 1998), the country's relatively favorable performance pertains to a somewhat select and privileged population. The challenge facing policymakers is therefore to ensure that learning outcomes do not deteriorate as survival rates in primary education improve and draw into the school population more and more of the weaker pupils.

Trends and social disparities in student achievement

The longest available time-series pertains to the results on three national examinations—for the *certificat d'études primaires élémentaires* (CEPE), the *brevet d'enseignement du premier cycle* (BEPC), and the *baccalauréat*—which are taken at the end of the primary, lower secondary, and upper secondary cycles, respectively (Table 5.20). Countrywide, pass rates on the CEPE and the BEPC remained more or less stable during the 1990s, averaging about 43 percent at the primary level during the decade and about 28 percent at the lower secondary level. The

Table 5.20
Trends in Pass Rates on National End-of-Cycle Examinations, Madagascar, 1989–99

Examination[a]	1989–90	1990–91	1991–92	1992–93	1993–94	1994–95	1995–96	1996–97	1997–98	1998–99
CEPE	52.6	—	45.5	33.4	43.5	37.3	51.4	41.4	43.9	46.0
BEPC	—	26.8	26.4	30.5	24.7	24.1	27.6	34.3	26.1	—
Baccalauréat	—	—	—	18.8	26.0	27.9	22.3	31.3	29.6	32.3

— Not available.
Note: BEPC, *brevet d'enseignement du premier cycle*; CEPE, *certificat d'études primaires élémentaires*.
a. The results for the CEPE and the BEPC pertain to students in both public and private schools; those for the *baccalauréat* pertain to public schools only.
Source: MINESEB data files.

Table 5.21
French and Mathematics Test Scores, Grades 2, 4, and 5, Madagascar, 1997–99
(percentage correct)

Subject and group	Grade 2	Grade 4	Grade 5
FRENCH			
Urban	62	65	44
Rural	54	52	41
Boys	57	56	41
Girls	59	54	43
Private schools	66	65	48
Public schools	55	50	40
Sample average	**58**	**56**	**42**
MATHEMATICS			
Urban	70	52	60
Rural	63	41	57
Boys	65	43	58
Girls	68	44	59
Private schools	71	49	63
Public schools	65	41	57
Sample average	**66**	**44**	**59**

Source: For grades 2 and 5, 1997–98 Programme d'Analyse des Systèmes Educatifs de la CONFEMEN (PASEC) survey; data are for scores on tests taken toward the end of the school year. For grade 4, 1999 UNESCO-sponsored Monitoring Learning Achievement (MLA) survey; data are for scores on tests taken around the middle of the school year.

results at the primary level vary substantially across provinces, and there is no consistent pattern to the trend over time. At the lower secondary level the provincial variation in pass rates is smaller, and the ranking of the provinces appears more or less unchanged over time. The results on the *baccalauréat* examination (which apply only to the public schools) show a rising trend, but as at the other levels, the pass rate remains modest, with barely a third of the candidates passing in the late 1990s.

With regard to social disparities in learning, Table 5.21 presents the relevant data for the three grades for which comparable data exist. The test scores show a highly stable pattern across the three grades: in both French and mathematics urban children typically outperform their peers in rural areas; boys and girls achieve about the same results; and children attending private schools attain noticeably higher scores than those in public schools.

Correlates of learning

What are the sources of disparities in learning captured in the broad-brush picture presented so far? To what extent, for example, is the private school advantage associated with pupils' socioeconomic background, selection bias in school choice, and gaps across schools in managerial effectiveness? More broadly, what are the correlates of student learning in Madagascar? These questions can be addressed using data from the 1997–98 survey for Madagascar sponsored by the Programme d'Analyse des Systèmes Educatifs de la CONFEMEN (PASEC), which gathered information on separate samples of about 1,900 pupils in grades 2 and 5. The survey is particularly suitable for this analysis because it tested pupils at both the beginning and the end of the school year. This makes it possible to model the determinants of learning as a dynamic process over the course of a school year and so assess the impact of the learning environment, as well as other factors.[16]

Following common practice in the economics of education, year-end test scores are modeled as a function of pupils' personal characteristics, including initial learning at the start of the school year; pupils' family background; and school and classroom conditions, including characteristics of the teacher.[17] As an example, the regression results for the grade 2 sample appear in Table 5.22, which presents estimates for two models estimated (a) with and without using school inputs as separate regressors and (b) using ordinary least squares (OLS) and controlling for selection bias. Similar regression results for the grade 5 sample are reported in Appendix table A5.13.[18]

As expected, the regression results for both the grade 2 and grade 5 samples confirm the importance of initial test scores as a determinant of year-end achievement. Learning is a cumulative process, and so a strong foundation in the early grades is critical for performance in subsequent

Table 5.22
Correlates of Combined Scores in Mathematics and French, Grade 2, Madagascar, 1997–98

	Excluding school inputs as regressors		Including school inputs as regressors	
Variable	OLS	Controlling for selectivity	OLS	Controlling for selectivity
Intercept	0.080	0.073	–1.242	–1.164
	(0.64)	(0.59)	(4.37)**	(4.12)**
Initial test score	0.551	0.544	0.548	0.541
	(28.53)**	(28.11)**	(28.07)**	(27.66)**
Girl	0.079	0.087	0.067	0.073
	(2.15)*	(2.37)*	(1.83)	(2.02)*
Age	0.019	0.067	0.019	0.058
	(1.37)	(4.02)**	(1.37)	(3.47)**
Repeater	–0.058	–0.054	–0.053	–0.052
	(1.50)	(1.41)	(1.38)	(1.35)
Speaks only Malagasy at home	–0.199	–0.164	–0.161	–0.138
	(3.13)**	(2.58)**	(2.47)*	(2.12)*
Receives parental help with homework	0.033	0.017	0.027	0.017
	(0.78)	(0.39)	(0.62)	(0.39)
Has mathematics or reading textbook			0.141	0.129
			(3.36)**	(3.10)**
Class size			–0.002	–0.001
			(2.20)*	(1.21)
Teacher's years of experience			0.002	–0.001
			(0.64)	(0.41)
Teacher's years of formal education			0.002	0.002
			(0.63)	(0.82)
Teacher's months of preservice training			0.011	0.014
			(1.09)	(1.36)
Index of physical facilities of classroom[a]			0.011	0.010
			(5.30)**	(4.79)**
Private school	0.178	0.734	0.161	0.604
	(3.86)**	(6.51)**	(2.96)**	(5.18)**
λ		0.369		0.314
		(5.35)**		(4.30)**
R^2	0.34	0.35	0.35	0.36
Number of observations	1,993	1,993	1,993	1,993

* Statistically significant at the 5 percent level.
**Statistically significant at the 1 percent level.
Note: The figures in parentheses are the robust *t*-statistics. The letter λ denotes the correction term for sample bias.
a. The index is constructed using principal-components analysis based on the following physical conditions of the classroom: the structure is permanent, it has electricity, and it is equipped with a cupboard, with chairs and tables for all pupils, and with rulers, set squares, compasses, a dictionary, and maps of Madagascar, Africa, and the world. The index ranges from 116 for classrooms with all these features to 83 for those with none of them.
Source: Based on data from the 1997–98 PASEC survey for Madagascar; see Appendix table A5.11 for the sample means.

years. But children from disadvantaged backgrounds typically start their school year already handicapped in this regard. For example, second-graders in the sample who come from homes where only Malagasy is spoken score about 0.05 standard deviation below the sample mean on the combined mathematics and French tests, compared with 0.02 standard deviation above the mean among those who come from families where French is spoken as well.

With regard to the other influences on progress in learning during the school year, the regression results conform to the expected pattern: what matters are the quality of a child's home environment, access to textbooks, the physical facilities of the classroom, and the type of school attended. Interestingly, a teacher's exposure to preservice training has no impact in either grade 2 or grade 5. A possible explanation is that teachers without preservice training find other ways to compensate for this gap in their professional profile—for example, through school-based mentoring arrangements. Another is that existing preservice teacher training programs are ineffective in teacher preparation. Among fifth-graders, a teacher's level of formal education and class size affect student achievement—both in the expected direction—whereas these factors hardly matter in grade 2.

Public-private sector differences in learning outcomes

In both the grade 2 and grade 5 samples the coefficients on the private school variable are consistently positive, suggesting that all else being the same, pupils in private schools have better test scores. Three possible factors account for private schools' superior performance: (a) ability to attract a preferred clientele (e.g., those who share certain values or characteristics, such as a stronger motivation to succeed academically, greater parental interest in the children's academic progress, and so on); (b) better resource endowment; and (c) greater efficiency in managing the available resources to enhance learning.

To assess the relative importance of these factors in producing the observed private school advantage, we follow the method explained in detail in

Table 5.23
Private School Advantage over Public Schools in Test Scores, Madagascar, 1997–98
(units of standard deviation from the sample mean)

Influence of selection bias included or excluded[a]	Factors to which private school advantage is attributable[b]	
	Combined influence of all school assets, tangible and other	Better management and other intangible school assets
GRADE 2		
Included	0.18	..
Excluded	0.04	0.02
GRADE 5		
Included	0.31	..
Excluded	0.26	0.40

.. Not applicable.
Note: The scores refer to the combined results on the mathematics and French tests.
a. The influence of selection bias is included when the estimates are based on the OLS specification and excluded when the estimates are based on the Heckman two-step procedure.
b. After controlling for the influence of pupils' personal and family background. All estimates are statistically significant at the 1 percent level.
Source: Based on the regression results reported in Table 5.22 and Appendix table A5.13. For details on the derivation of these estimates, see the Technical Note on Regression Models on Student Achievement that follows Chapter 8.

the Technical Note on Regression Models on Student Achievement (following Chapter 8) and obtain the results presented in Table 5.23. Consider first the estimates for the second-graders. After controlling for observed differences in pupils' personal and family characteristics, the average year-end test score in private schools exceeds that in public schools by 0.18 standard deviation from the sample mean, reflecting the combined influence of selection bias and the totality of school factors (including both tangible assets and intangible assets such as management efficiency).[19] That advantage shrinks to only 0.04 once selection bias is taken into account, wiping out nearly 80 percent of the private school advantage. It drops further, to 0.02, after allowing for the fact that private schools in the sample have a more generous endowment of tangible school inputs for grade 2 instruction than their public school counterparts. Selection bias is thus the overwhelming source of private schools' superior performance on the grade 2 tests.

The results for the grade 5 sample are quite different. The initial gap, after controlling for observed differences in pupils' personal and socioeconomic background, is 0.31 standard deviation from the sample mean, again reflecting the combined influence of social selection and differences in school factors, tangible or otherwise. Allowing for selection bias reduces the private school advantage to 0.26, a drop of only 17 percent. Private schools in the sample have higher pupil-teacher ratios (46, compared with 34 in public schools) and less experienced teachers (11 years on average, compared with 17 years). Thus, after allowing for these handicaps and other differences in tangible school inputs, we find that instead of shrinking, the private school advantage actually widens to 0.40 standard deviation above the sample mean. This result can be attributed to private schools' greater effectiveness in managing the pedagogical process.[20] Thus, in contrast to the situation among second-graders, social selection is much less important than managerial efficiency in explaining private schools' superior performance among fifth-graders.

Taken together, these findings point to the following conclusion. Private schools can and do indeed select pupils with preferred profiles, and this advantage is one reason why private school students attain better test scores. Yet the role of selection bias diminishes as the cumulative influence of better management of the learning process takes hold. By the time children reach grade 5, selection bias plays a substantially smaller role, while differences in how well available resources are used to produce student learning become by far the most important factor. This result leads to the next question: how can public schools become more efficient in the delivery of services?

A closer look at performance within the public sector

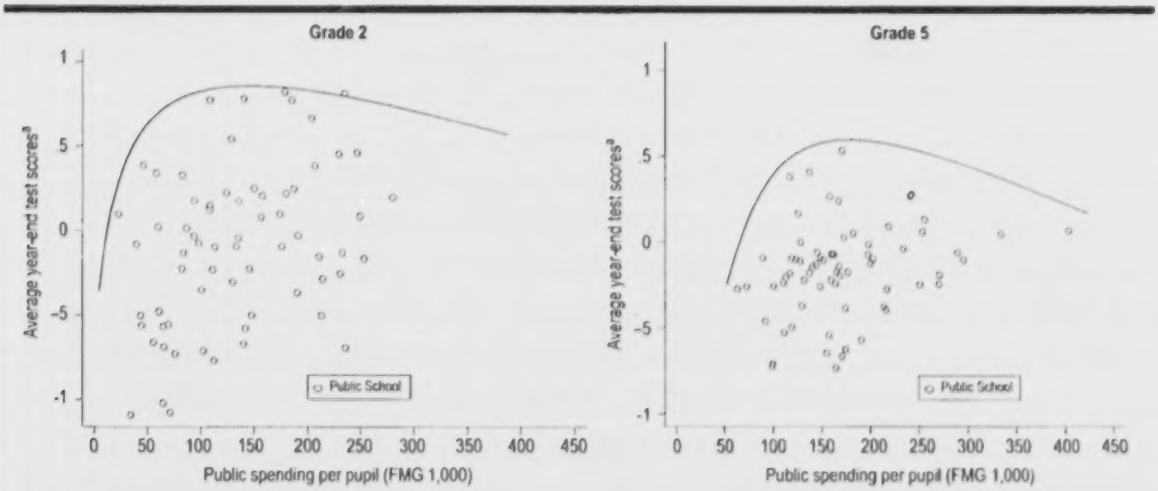
To answer the question, we pursue two lines of analysis. Both use the school as the unit of analysis. In the first approach we rely on data for the 70 public schools in the 1997–98 PASEC survey; in the second we use data for the entire population

of public schools that presented candidates for the national examinations in 1997–98: about 4,640 schools for the CEPE examination, and about 505 schools for the BEPC examination. In both approaches we use per-pupil spending on school personnel (teachers and nonteachers) as a measure of each school's endowment of financial resources. This variable is computed from information in the school census on the salary grade of each staff member, supplemented by data on staff benefits.[21] Although the small sample in the PASEC survey is a handicap, the survey does contain information on pupils' incoming and outgoing test scores, as well as each child's personal and family background. This information facilitates estimation of a value added model of learning and allows comparisons across schools to be adjusted for the socioeconomic composition of the student population. With regard to the analysis based on examination results, the advantage is that it pertains to the whole public system, even though student achievement is measured at only one point in time and there is no information on students' socioeconomic background.

Relation between test scores and spending per pupil at the school level. The regression results showing the correlates of student learning in the sample of 70 public schools in the PASEC survey appear in Appendix table A5.14. Consistent with earlier results, they suggest that access to textbooks and spending per pupil are among the policy-sensitive variables that affect student learning in public schools. The impact of textbook availability is substantial: among fifth-graders, for example, all else being the same, those supplied with books pull ahead in test scores by an average of about one-quarter of a standard deviation, a gain that is about twice as large as that reported in the earlier analysis based on the combined data for public and private schools. The effect of public spending per pupil is much more modest: all else being the same, a doubling of spending from the sample average of FMG 150,000 per pupil improves year-end test scores by no more than one-seventh of a standard deviation.

Using the regression results, we can simulate the relation between per pupil spending and year-end test scores with schools instead of individual pupils

Figure 5.7
Relation between Per-Pupil Spending on School Personnel and Test Scores, Public Schools, Madagascar, 1997–98



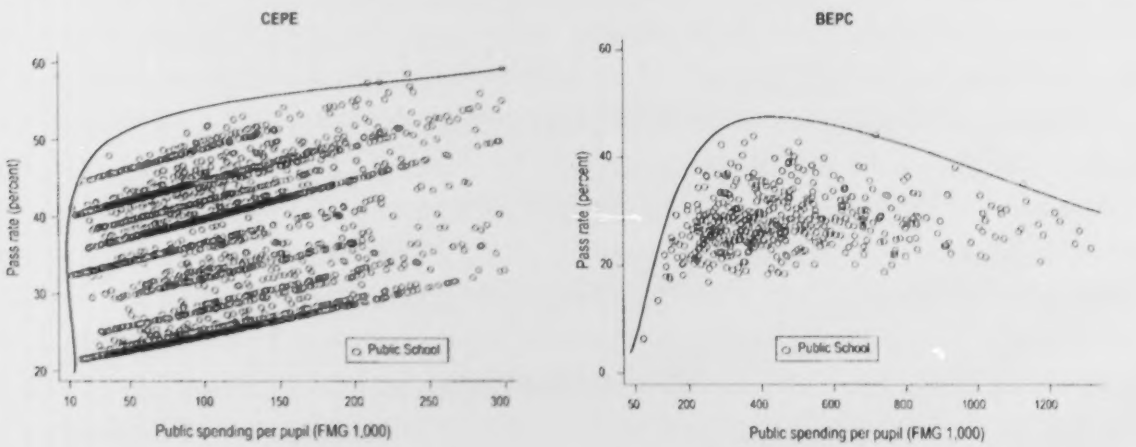
Note: FMG, Malagasy francs.
a. School-level average predicted from the regression estimates reported in Appendix table A5.14 at the sample means of pupils' personal and family characteristics as well as initial test scores.
Source: Appendix table A5.14.

as the unit of observation. The results appear in Figure 5.7.[22] The figure suggests that while better-endowed schools tend, on average, to deliver better outcomes, there is a huge range of outcomes across similarly endowed schools, confirming the weak link between spending and outcomes discussed above. Furthermore, we can trace an empirical production frontier that identifies schools with the best results for given levels of spending. In both samples the frontier shows a familiar shape; performance rises with spending and then levels off (or even falls off) after some point. The fact that so many schools lie well inside the frontier is a telltale sign of weak management of pedagogical processes in the public school system.

Relation between examination pass rates and spending per pupil. The relevant regression results (see Appendix table A5.15) are used to simulate the relation, shown in Figure 5.8, between examination pass rates and spending per pupil on personnel, keeping constant across schools the influence of geographic location and the condition of physical facilities.[23] As before, spending per pupil has a statistically significant, though modest, impact on CEPE and BEPC pass rates. What is striking is the very loose connection between the two variables. For example, pass rates for primary schools spending FMG 100,000 per pupil range from just under 25 percent to nearly 50 percent, and pass rates across lower secondary schools spending FMG 400,000 per student range from less than 20 percent to more than 40 percent.

Both analyses presented above, using the PASEC survey data and national examination results, provide consistent evidence that the public school system in Madagascar could benefit from better management of teaching and learning processes at the school and classroom levels. In this regard it is useful to differentiate among four types of schools according to their relation to the empirical production frontier: (a) poorly endowed schools located near the learning frontier; (b) better-endowed schools located at the point where the frontier is just beginning to flatten out or turn downward; (c) highly endowed schools located on the downward part of the frontier; and (d) schools inside the frontier, regardless of their level of endowment. Schools in category (b) provide the best value for money. Schools in the other three categories could be better

Figure 5.8
Relation between Examination Pass Rates and Spending Per Student on School Personnel, Madagascar, 1998



Note: FMG, Malagasy francs. Pass rates are controlled for geographic location and differences in the condition of physical facilities across schools.
Source: Based on MINESEB 1997-98 school census.

managed in the sense that those in category (a) could probably do with more resources, while those in categories (c) and (d) need much closer supervision, either to justify the large input of resources or to stimulate better performance. The latter task can be accomplished in various ways but would almost certainly involve two simultaneous measures: equipping teachers and school administrators to do a better job through such means as demonstrably effective in-service training and professional development programs, and giving teachers and other school personnel appropriate incentives to deliver.

Decentralization and Local Management of Service Delivery

Following a common trend in many developing countries, education decentralization is under way in Madagascar. The broader context is the constitutional reforms approved in March 1998, which have expanded the role and autonomy of provincial authorities.[24] Given the newness of the general decentralization to lower levels of government, it is as yet unclear how the management of education is likely to evolve. In the meantime, the government has been experimenting with a second type of decentralization focusing on schools and their management. That process has been going on since about 1997, and some information is available on the experience thus far. This section summarizes key features of the mechanisms currently in place, particularly the arrangements under the *contrats-programmes* and the decentralization of financial management to the district level. As background, it also presents a distillation of lessons from other countries that have progressed further in decentralizing educational management to the school level.

Contrats-programmes

Drawing on the lessons from the first phase of the Programme National pour l'Amélioration de l'Education (PNAE I), the government decided to encourage wider participation in school-based management in the second phase of the program, PNAE II, launched in 1997 (see Madagascar 1997b). The policy was first implemented in 2,600 schools through the mechanism of *contrats-programmes*, which set out explicit responsibilities for the parties involved—parents, teachers, and school administrators. The contract commits the parties to specific targets for increases in enrollment and examination pass rates and for decreases in teacher absenteeism, and to specific contributions of materials and labor for classroom renovation and construction. Local steering committees were established to monitor the implementation of the *contrats-programmes*. In addition, the Programme de Renforcement et d'Amélioration de la Gestion Administrative et Pédagogique (PRAGAP) was created to channel the government's contribution of school construction materials in support of local efforts, supplying inputs that communities may be unable to mobilize themselves. The focus on construction and renovation is motivated in part by the belief that improvements in physical facilities could help enhance the quality of teaching.

The experience to date suggests that the *contrats-programmes* raise communities' expectations, not least because the arrangement involves a substantial financial commitment. (The community contribution for school construction and renovation can account for as much as 40 percent of the total costs of the projects.) The *contrats-programmes* also expand teachers' responsibilities, but with no link to financial incentives, and sometimes make them accountable for outcomes over which they have little direct control, such as dropout behavior. The program is very new, and it is certainly too early to judge its effectiveness in enhancing local participation in school management. In light of the expectations being built up, however, there is significant risk of community disengagement if the mechanism fails to produce the expected improvements in educational outcomes.

Decentralizing financial management

The *chefs CISCO*—heads of the country's 111 school districts, each with about 100 schools to supervise—are currently the designated managers of MINESEB's "deconcentrated" school funds. (These funds cover certain nonsalary recurrent spending.) Although certain financial operations are managed at the school district level, the central ministry still preallocates the funds by school and by budget line.

Thus, the role of the district heads in financial management does not involve management in the true sense of the word but is limited to processing the use of the funds. In an arrangement in which funds for education were truly decentralized, the central ministry would allocate a global budget to the school districts and would give them the autonomy and responsibility to allocate resources across schools according to need. Under the current setup, it appears that many primary schools in fact do not receive the full amount of their entitlement from the central ministry. Given this experience, it is reasonable to ask whether the current mechanisms are sufficiently efficient and transparent. It is also reasonable to wonder whether it might not be better to decentralize the funds right down to the level of the schools themselves.

In addition to the arrangements in MINESEB, the government has recently begun to channel funds for the operation and maintenance of public primary schools to the country's 1,392 *communes de crédits* via the Ministère chargé du Budget et du Développement des Provinces Autonomes (MBDPA). The amounts involved are not large—about FMG 4,872 million in 1999, or 6.3 percent of MINESEB's nonsalary recurrent spending in that year—but the criterion for allocation across schools appears unsatisfactory, based as it is on the number of people in the general population rather than on the number of school-age children in the community. The MBDPA apparently relies on this seemingly irrational basis for allocating the funds because it lacks information on the numbers of schools and pupils in each community. If this is so, there is obviously room for the MINESEB to work more closely with the MBDPA to ensure a more equitable distribution of the funds.

Lessons from other countries' experiences

There is a substantial and growing literature on the subject of decentralization. Our purpose here is not to provide a comprehensive summary of the findings but to highlight the lessons learned thus far regarding the key ingredients needed in any effort to improve school performance and accountability through decentralization to the school level (see Box 5.1). After reviewing experience in Latin America, Winkler and Gershberg (2000) reached the conclusion that "at least some of the characteristics of education decentralization reforms that focus on school autonomy, as opposed to municipal or regional autonomy, contribute to higher-performing schools. Decentralization to sub-regional governments may also yield some educational benefits by allowing greater innovation and greater flexibility to adapt resource allocation to local prices, but they have not yet been proven." In the Malagasy context, the authors' conclusion implies that whatever the broader arrangements for sharing responsibilities for education management between the central and provincial governments, it would pay to focus on processes at the school level if the goal is to improve school performance.

Conclusion

In this chapter we have focused on various aspects of service delivery in primary and secondary education. Although poverty and other socioeconomic factors do constrain school attendance, the demand for schooling nonetheless appears strong in most parts of the country, as suggested by the high rates of entry to grade 1 (except in Toliara, where it is still less than 60 percent); the strong transition rates between primary and secondary cycles of schooling; the much higher than average rates of repetition in the last grades of the two secondary cycles; and families' willingness to pay out-of-pocket for education services, even those offered in public primary schools. Yet only one-third of the grade 1 entrants stay enrolled for the full five years of primary schooling, suggesting that the supply of schooling is probably not well adapted to the demand. This inconsistency may arise for several reasons, including possible conflicts between the school calendar and seasonal patterns of work in the rural economy (which would raise the opportunity cost of schooling for children whose families need their help with farm work during peak seasons), lack of a close-by school, the poor quality of instruction, or children's failure to make progress in school.

The challenge for the education system's managers is therefore to find ways to enhance the system's responsiveness to the demand. One asset of the Malagasy system is the important role played by the private sector, particularly in secondary edu-

Box 5.1
What Has Been Learned from Effective Reform Strategies in Education?

1. **Educational reform is a local process.** The school, not the ministry or the district administration, is the center of change. Schools determine the degree of success: they can block implementation, enfeeble it, or bring it to effective life. If schools are to improve the quality of their programs effectively, they need to play an active and creative role.

2. **Central support is vital.** The issue for the central ministry is to learn how to support local schools in their efforts—in other words, how to support, encourage, empower, enable, and build a strong local school. Giving more responsibility to the individual school presupposes a strong support structure in the system at large, one that must be built around the real needs of schools in development. For the central level it implies the need for a system of reform and a division of labor to effectively support the local level.

3. **Effective system linkages are essential.** The strategy in complex systems is to identify effective linkages, nonbureaucratic in nature, between the national, district, and local levels. For communication within the system to be effective, local empowerment is needed, and this usually comes about through further decentralization. A clear administrative mechanism that combines pressure and support and secures the delivery of needed resources is required.

4. **The reform process is a learning process.** The process is evolutionary and developmental in nature. It cannot be blueprinted ahead of time. The key to success is to get good data from all parts of the system on a continuous basis and to study and work on the data at the school district level and subsequently at the central level. This implies a competent supervision and monitoring system.

5. **Think systemically, and think big.** A vision of reform that affects school life substantially will have more effect than a cautious, incremental approach. Any major reforms in complex systems will need to build structures and capabilities at all levels. Ad hoc solutions will not work in the long run; only institution building based on sustained commitment works.

6. **Focus on classroom practice.** The clue is to focus on the dynamics of the classroom and the individual school, since this dynamic to a large extent determines the success of implementation. It is essential that the supporting materials, whether nationally developed and locally adapted or locally built from the start, be of good quality.

7. **See teachers as learners.** Good materials and facilities are a necessary but insufficient condition. Teacher mastery is crucial for impact on students, and it can best be developed through a systematic local learning process that includes in-service training, supervision, and coaching in a collegial atmosphere.

8. **Commitment is essential at all levels.** Commitment is crucial at the central level for sustained effort and the maintenance of needed support structures. It is also essential at the district and school levels, but it cannot be transmitted downward to schools. Commitment at the school level results from empowered successful action—personal mastery that starts with effective assistance and develops with practice. In effect, local empowerment builds emotional as well as administrative and problem-solving capacity.

9. **Both local and central initiatives work.** An innovative idea that starts locally (Colombia), nationally (Ethiopia), or with external donors (Bangladesh) can succeed if programs meet the criteria of national commitment, local capacity building, and linkage, in a configuration that makes sense for the particular country.

10. **Parent and community participation contributes to success.** Parent and community participation leads to commitment and contributes to outcomes. It is essential for the development and maintenance of primary schools in rural areas. Effective participation includes a real role for parents in school decisionmaking.

Source: Dalin and others (1994), cited in Winkler and Gershberg (2000).

cation, which allows the government to pay more attention to service delivery at the primary level. But the performance of the public system leaves much room for improvement. The network of public schools covers most of the country's 11,000 *fokotanys*, ruling out simple lack of close-by schools as the predominant factor in dropout behavior (although that may be important in certain localities). Probably more important is the unattractiveness of instruction in many schools, especially primary schools in rural areas. In many of these schools, service delivery appears to be hampered by a very poor distribution of resources across schools, as revealed by a pattern of staff deployment that clearly favors urban schools and schools at the secondary level, to the extent that even the larger urban primary schools consistently fail to take advantage of scale economies in their operations. There is inadequate management of the school map in the sense that tradeoffs are made in favor of small

schools (which may be entirely consistent with the realities of a sparsely populated country) without sufficient attention to their cost implications and the need for parallel interventions, such as multisubject teaching in secondary schools, to manage the costs. And while multigrade teaching is widespread, the practice appears to save on costs at the expense of children's access to full-day instruction.

Beyond these proximate deficiencies in the supply, there is also evidence that the pedagogical process in public schools could itself benefit from tighter management to ensure that the resources made available to the schools are effectively transformed into student learning. Recent innovations by the government to encourage greater local participation in school management could provide part of the missing ingredient by increasing local monitoring of school performance, but the arrangements so far are still too new for their effectiveness to be evaluated. The country could nonetheless learn from the experience of other countries with more mature processes. That experience suggests that when properly managed and focused on school-level autonomy and accountability, education decentralization could be a catalyst for improved school effectiveness. The challenge is for Madagascar to adapt those experiences to its own social and institutional context and so maximize the productivity of the country's investment in education.

Notes

1. In some private schools the available information about the level of secondary schooling offered is not clear. Excluding those schools leaves a sample of 184 private schools for which the urban-rural breakdown can be computed.

2. Multigrade teaching refers to an arrangement under which a teacher instructs children of different grade levels in the same class. It is especially attractive as a cost-saving approach in systems with small schools.

3. A more detailed analysis would consider not just the sheer numbers of teachers a school receives but also their quality. We focus here only on the first dimension, leaving to a later section the examination of differences in teacher qualifications across schools.

4. For comparison, note that Madagascar's R^2 statistic is smaller than the corresponding figures for Mauritania (0.83), Mozambique (0.86), and Niger (0.95) and is larger than those for Burkina Faso (0.72) and Benin (0.61). Although the country's relatively low population density and other factors may affect the feasibility of achieving consistency in teacher deployment across schools, the experience in Burkina Faso and Benin is nonetheless illustrative of the scope for improvement.

5. The specification ignores possible economies of scale in the relation between teacher allocation and enrollments, which are discussed later in this chapter. To the extent that economies of scale exist, the calculations here would tend to underestimate teacher surpluses in large schools, and to the extent that most large schools are located in urban areas, the calculation would underestimate the prevalence of overendowed schools in urban areas.

6. Like their counterparts at the primary level, some understaffed lower secondary schools rely on FRAM-paid teachers to make up for the shortfall of teachers. Of the 58 FRAM-paid teachers at this level of schooling, 50 work in Antananarivo Province, where, outside the capital city, the share of understaffed schools is among the highest in the country.

7. Responsibility for implementation falls to different levels in the system depending on the nature of the staff transfers involved: to the managers of the school district *(circomscription scolaire,* CISCO) if the redeployment involves transfers within one of the country's 113 CISCOs; to managers at the provincial level (DIRESEB) if it involves transfers across CISCOs; and to managers at the central ministry (MINESEB) if it involves transfers across provinces.

8. The number of teachers is expressed simply as a function of the number of pupils, as in model 1 in Table 5.8. We use estimates based on the whole sample of public and private schools in order to establish staffing norms that reflect overall practices in the system.

9. The underlying data for the analysis pertain to teachers hired in both rounds of recruitment. Using information on the schools to which these teachers were assigned, we merged the data with those from the 1997–98 school census. Some teachers were mapped to schools that were not in the school census and were thus dropped from the analysis. The usable data pertain to 957 schools that received at least one new teacher, in a population of 9,209 schools.

10. According to the regression estimates, the results for the system as a whole suggest that a 10.0 percent increase in school size is associated with an 8.0 percent increase in a school's total spending on personnel, but the corresponding increase in spending is a roughly proportionate 10.4 percent in the urban sample and only 6.6 percent among rural schools.

11. Full-day services are defined as at least 6 hours of instruction daily. Further disaggregation of the data suggests that about 27 percent of the public schools with 50 or fewer pupils offer 3 to 4 hours daily and that 40 percent of the schools offer only 1 or 2 hours. In the private sector the corresponding percentages are 13 and 17 percent, respectively.

12. See Little (1995) for a review of multigrade teaching; see Colbert, Chiappe, and Arboleda (1993) and Kraft (1998) for details on the approach in Colombia and Guatemala, two countries with internationally known programs in multigrade teaching.

13. See Appendix table A5.8 for the relevant regression estimates.

14. For more detailed findings on Madagascar, see Madagascar (1999d).

15. The sample average scores on the tests for life skills, literacy, and numeracy were, respectively, 60.8, 53.4, and 47.2.

The corresponding scores for Madagascar were 72.1, 54.7, and 43.7. Sample sizes varied across countries, ranging from 8,346 pupils in Uganda to 1,365 pupils in Mali.

16. By contrast, the 1999 UNESCO Monitoring Learning Achievement (MLA) study tested children only once.

17. Because of sample size limitations, the choice of specific variables in the three domains is deliberately parsimonious. For example, we include a variable indicating whether a school is public or private but not one indicating whether it is located in an urban or rural area because most private schools in the sample were in fact in urban areas. Similarly, we include variables indicating whether a child speaks only Malagasy at home and whether the child receives parental help with homework, but we do not include variables for the educational level of the parents or for household wealth, given the last two variables' high correlation with the other variables on family characteristics. (See Appendix table A5.11 for the means of the regression variables.)

18. See the Technical Note on Regression Models on Student Achievement that follows Chapter 8 for a complete explanation of our analytical approach. The correction for selection bias follows Heckman's two-step procedure. In the first step the probability that a child attends a private school is estimated, and that estimate is then used to compute a correction for inclusion in the regression of the correlates of student learning. (The term is denoted as l in Table 5.22 and Appendix tables A5.13 and A5.14; estimates of the model of private school attendance appear in Appendix table A5.12.)

19. Note that 0.18 corresponds exactly to the coefficient estimate on the private school variable in the OLS regression.

20. Because of data limitations and a desire for parsimony in model specification, the regression contains only the key variables describing the schools and classrooms. The effects of differences in endowments that are not included in the model are therefore captured in what appears under the label of differences in efficiency.

21. Because spending on other inputs is not separately available, the analysis used an index of the material condition of the classroom context as a proxy for this aspect of school inputs.

22. The figure is based on the regression estimates reported in Appendix table A5.14. For each school in the sample, the average year-end test score is predicted by evaluating the regression equation at the sample means of all the regressors except public spending per pupil, which is school-specific. The predicted test score is then plotted against the latter variable.

23. As indicated earlier, these are the only differences across schools that the data allow us to control for.

24. The government's plans for decentralization took a concrete step forward with the election of provincial governors on December 8, 2000.

6

Vocational and Technical Education and Training

Vocational and technical education and training occupies a relatively modest place in Madagascar's education system, but its role can be expected to expand, albeit slowly, as the economy grows and jobs in the modern sector are generated. This expectation has motivated many of the recent reforms in the subsector. Without delving into the details of the reforms, this chapter documents the current arrangements for delivering vocational and technical education and training and, to the extent that the data permit, compares the organization, costs, and performance of the public and private sectors as providers of this training. The discussion focuses only on initial vocational and technical education; issues pertaining to in-service skills development are covered in Chapter 8.

The main conclusion is that beyond the reforms already in place, more work is needed to enhance the subsector's performance. The key issues pertain to the high cost of service delivery in the public sector, which is attributable to a combination of such problems as the heavy share of administrative costs at the level of individual institutions, the high degree of geographic fragmentation in the system, the uneconomic sizes of most institutions, and the lack of diversification and specialization in service delivery. Furthermore, the fact that many graduates of technical schools go on to higher education rather than into the labor market brings into question the subsector's orientation to the world of work. A challenge for policy development is therefore to find ways to bring down the cost of service delivery and to define a more effective role for government intervention in the sector, beyond that of a direct service provider.[1]

Historical and Institutional Context

The development of vocational/technical education in Madagascar began in the early years of the 19th century, when training centers were opened by British missionary and architect James Cameron, with no less than 600 apprentices. Toward the end of the century the French colonial administration created in each significant population center a regional school of apprenticeship equipped with a workshop for providing courses in agriculture, commerce, and light industry. After independence, the First Republic established broad policies for vocational/technical education and supported several types of institutions in this area, including handicrafts centers for training workers and craftsmen, apprenticeship centers to prepare students for the *certificat d'aptitude professionnelle* (CAP), and technical colleges that offered courses in industry and commerce leading to the *baccalauréat technique* (BT). During the Second Republic the government passed Decree 78-040 to formalize the participation of youths in productive activities and sought to revitalize vocational education by creating a new agency, TEFISO (Teknica Fiofanana Sosialista). Unfortunately, because of funding constraints, TEFISO failed to achieve the hoped-for results.

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In 1992, faced with a system that was failing to bring about a proper alignment between training and the qualifications sought by employers, and wishing to ensure that the vocational/technical education system supported the development of the economy, the government launched a major reform of the system. Vocational/technical education, which had been under the Direction de l'Enseignement Technique et de la Formation Professionnelle (DETFP) in the Ministry of Education, was transferred to the Délégation Générale du Gouvernement à l'Enseignement Technique et à la Formation Professionnelle (DGGETFP), which itself came under the direct authority of the Prime Minister's Office (Primature). In 1995 the DGGETFP was restructured, becoming the Ministère de l'Enseignement Technique et Formation Professionnelle (METFP), with responsibilities ranging from initial training to continuing skills development.

At the same time, various organizations charged with promoting vocational/technical education were put in place. These included, notably, the Conseil National de la Formation Technique et Professionnelle (CNFTP), which is responsible for ensuring that training is oriented toward the needs of the labor market and for managing the Fonds d'Intervention à la Formation Professionnelle (FIFP), a fund set up to finance skills development; l'Observatoire National des Compétences pour l'Emploi (ONCE), created to improve the quality of information on the labor market and its evolution; and the Centre de Ressources des Personnels des Etablissements d'Enseignement Technique et Professionnel (CERES), which helps teachers in vocational/technical education maintain their technical knowledge and competencies.

In parallel, the management structure of the METFP was decentralized, and the regional boards were given financial autonomy. The Associations Régionales Inter-Professionnelles pour le Développement de la Formation Professionnelle (ARIFs) were created, with representation from employers, producers, and various producer associations, to encourage the articulation of training needs at the regional level. To allow the supply of training to respond more efficiently to this demand, vocational/technical education institutions were organized into bodies called Groupements Inter-Régionaux d'Etablissements de Formation Technique et Professionnelle (GIREFTPs). Administratively and financially autonomous, the GIREFTPs are able to offer modular training programs adapted to local needs, thanks to arrangements for pooling their resources. In recognition of the important role of the private sector, the Office National de l'Enseignement Technique et de la Formation Professionnelle Privée (ONETFOPP) was created in January 2000, with responsibility for regulating and overseeing private training institutions.

The organization of training has itself been the object of recent reforms, although for the moment they exist mainly on paper. In the public sector, vocational/technical education has traditionally been provided by two types of institutions: the *centres de formation professionnelle* (CFPs) and the *lycées techniques professionnels* (LTPs). The roles and responsibilities of these institutions were modified by Decree 97-1356 concerning the general orientation of vocational/technical education. The aim of the decree is to diversify the type and level of training offered, in part through the development of training in basic vocational skills (see Appendix table A6.1). To date, however, the decree's provisions are far from being implemented.

Demand for Vocational and Technical Education

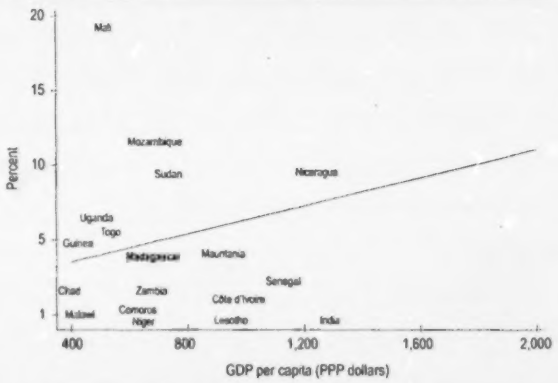
The demand for public sector vocational/technical education services is easy to describe. In the private sector the services are less well defined, reflecting in part the absence of strict regulation. In the discussion below we include in the private sector all students who attend a private institution offering initial vocational or technical training. By analogy with the public sector, only institutions that require entering students to have the *certificat d'études primaires élémentaires* (CEPE) or the *brevet d'enseignement du premier cycle* (BEPC) are included. Institutions requiring the CEPE are labeled "CFP-type establishments" and those requiring the BEPC, "LTP-type establishments."[2]

The level of demand

Between 1990 and 1997, the only years for which complete information on the public and private sec-

tors is available, the number of students in vocational/technical institutions rose by 23 percent, while the number in general secondary education fell by about 5 percent (Table 6.1). In 1997, 18,000 students were enrolled in initial vocational/technical programs, accounting for 6 percent of total enrollments at the secondary level. While the share seems modest compared with that in other poor countries such as Mali, Mozambique, and Sudan, it does not appear disproportionate, given Madagascar's level of economic development (Figure 6.1). In fact, in Madagascar as in many other developing countries, it is the imbalance within vocational/technical education itself that is of greater concern. With little more than 5,000 students, the lower-level (CTP) programs enroll only 2 percent of the students following various courses at the lower secondary level, whereas higher-level (LTP) programs enroll almost 20 percent of the students at the upper secondary level.

Figure 6.1
Vocational and Technical Students as Share of General Secondary Education Students, Madagascar and Selected Developing Countries, circa 1990



Note. GDP, gross domestic product; PPP, purchasing power parity.
Source: Summers and others (1994); USAID (2000).

Social disparities in access to vocational/technical education and training

Although precise information on the socioeconomic profile of those who enter vocational/technical education is lacking, the available data suggest that this type of course attracts a larger number of students from disadvantaged backgrounds than does general secondary education. According to the 1997 *Enquête Prioritaire auprès des Ménages*, only 7 percent of the students enrolled in secondary education come from the poorest 40 percent of households, while 61 percent come from the wealthiest 20 percent of households (Table 6.2). In contrast, the same survey shows that of the individuals under age 22 holding a vocational/technical diploma, whether or not they are still continuing their studies, 14 percent are from the poorest 40 percent of households, and only 36 percent are from the richest 20 percent of households.[3]

Table 6.1
Enrollments in Vocational and Technical Education and Secondary General Education, Public and Private, Madagascar, 1990–97

Period and cycle	Vocational/technical education	Secondary general education	Total	Share of vocational/technical education (percent)
1990–91	15,174	321,772	336,946	4.5
1996–97				
1st cycle[a]	5,480	250,858	256,338	2.1
2nd cycle[b]	13,112	56,416	69,528	18.9
Total	18,592	307,274	325,866	5.7

a. Includes students enrolled in lower secondary schools or the equivalent: CEG (lower secondary school), CFPs, and CFP-type institutions in the private sector as well as the public sector.
b. Includes students enrolled in upper secondary schools or the equivalent: *lycées*, LTPs, and LTP-type institutions in the private sector as well as the public sector.
Source: Authors' estimates based on data from the MINESEB and the METFP and from 1996 *Répertoire des Etablissements et Centres de Formation Technique et Professionnelle.*

Table 6.2
Access to General Secondary Education and Vocational and Technical Education, by Household Quintile, Madagascar, 1997
(percent)

Quintile	Enrolled in secondary education	Holders of a vocational/technical diploma[a]
1 (poorest)	3.0	5.9
2	3.7	8.4
3	8.4	23.6
4	23.6	26.1
5 (richest)	61.3	36.0
Total	100.0	100.0

a. Individuals under age 22 holding a CAP or BT degree, living with their parents, whether or not continuing their studies after these degrees.
Source: Authors' estimates based on data from 1997 *Enquête Prioritaire auprès des Ménages*.

Table 6.3
Gender Differences by Field of Vocational and Technical Study, Public Sector, Madagascar, 1990–91 and 1998–99
(percent)

Program and field	1990–91		1998–99	
	Boys	Girls	Boys	Girls
CFP				
Civil engineering	73.9	46.2	78.7	18.6
Industrial engineering	26.1	53.8	21.3	74.1
Services	0	0	0	7.3
Total	100.0	100.0	100.0	100.0
LTP				
Civil engineering	50.1	20.7	52.5	15.8
Industrial engineering	27.1	5.0	31.0	23.7
Services	21.6	71.8	15.5	59.9
Agriculture	1.1	2.5	1.0	0.6
Total	100.0	100.0	100.0	100.0

Source: Authors' estimates based on data from the METFP.

Gender differences

As in most developing countries, girls in Madagascar are less likely than boys to enroll in vocational/technical education; only 6 percent of the girls in the upper secondary cycle, for example, are in the technical stream, compared with 13 percent among the boys.[4] The gender gap is even more pronounced for programs within vocational/technical education. Considering only the public sector, for which data are available (Table 6.3), the majority of girls (60 percent in 1998 in the LTPs) chose service sector programs, whereas most of the boys were enrolled in civil or industrial engineering (84 percent in 1998 in LTPs). Nonetheless, since 1990 girls have been entering these and other programs usually favored by boys at a faster rate than the boys themselves. This new trend suggests a possible breakdown of labor market discrimination against women, as well as wider job opportunities for them in these fields as a result of the lack of qualified workers in certain typically male-dominated professions.

Supply of Vocational and Technical Education

This section describes the place of the private sector in vocational/technical education and the organization of public vocational/technical education, including the coverage and degree of specialization of individual public institutions.

The public-private mix

The private sector plays an important role in Madagascar's system of vocational/technical education, and there is reason to believe that it is the private sector which has stimulated the demand for training services in recent years. With 74 institutions, versus 60 in the public sector, the private sector accounts for an estimated 55 percent of total enrollments in vocational/technical education. It is especially active in supplying lower-level training, enrolling more than 75 percent of the students in programs at this level (Table 6.4). Although private institutions have been around for a long time, only in recent years has their number grown significantly: according to the METFP's *Répertoire des Etablissements et Centres de Formation Technique et Professionnelle*, 20 percent of the private institutions operating in 1996 came into being after 1990. Between 1990 and 1996, enrollments in the private

Table 6.4
Characteristics of Service Delivery in Vocational and Technical Education, Madagascar, 1990s

Indicator	Public sector			Private sector		
	CFP	LTP	Total	CFP-type institutions	LTP-type institutions	Total
Share of students enrolled in each sector, 1996–97 (percent)	26	51	44	74	49	56
Trends in enrollments (1990 = 100)						
1990–91	100	100	100	—	—	100
1996–97	78	94	91	—	—	167
1998–99	94	119	114	—	—	—
Number of institutions						
1990–91	31	25	56	—	—	—
1998–99[a]	34	26	60	40	34	74
Institutions by year of creation (percent)						
Before 1960	—	—	32	—	—	6
1960–1970	—	—	11	—	—	23
1970–1980	—	—	18	—	—	24
1980–1990	—	—	37	—	—	27
After 1990	—	—	2	—	—	20
Total	—	—	100	—	—	100
Number of students per institution						
1990–91	58	285	159	—	—	—
1998–99[a]	49	326	169	102	188	141
Institutions by size of enrollment[b]						
< 25	12	0	12	2	2	4
25–50	10	1	11	12	3	15
50–100	9	6	15	14	7	21
100–150	0	5	5	6	6	12
150–250	3	3	6	3	7	10
> 250	0	11	11	3	9	12
Total	34	26	60	40	34	74
Number of students/number of places (percent)	56	80	65	—	—	88

— Not available.
a. For the private sector, 1996–97.
b. Among institutions operating in 1996–97.
Source: Authors' estimates based on data from the METFP and from 1996 *Répertoire des Etablissements et Centres de Formation Technique et Professionnelle.*

sector rose by 70 percent, while those in the public sector fell slightly.

Delivery of services in the public sector

Service delivery in public vocational/technical education has changed relatively little over time; only four new institutions were created between 1990 and 1998. Paradoxically, despite the limited demand for public sector training, the scope of lower-level training programs appears to have expanded. Astonishingly, in Antsiranana and in Toamasina (which already had three and eight CFPs, respectively) enrollments in lower-level public sector training programs fell by 30 percent between 1990 and 1999 even as new public institutions were opened in the two provinces. Country-wide, the 34 CFPs run by the METFP have, on average, fewer than 50 students each, while the average enrollment in the corresponding private sector institutions is twice that. More than a third of the public CFPs enroll fewer than 25 students, and more than 40 percent of the available places in public institutions go unfilled. Overall, the LTPs perform better, filling about 80 percent of the available places. Nonetheless, many LTPs are too small to realize economies of scale in their operations; nearly half enroll fewer than 150 students each.

The geographic distribution of the public supply is, moreover, quite uneven: 21 of the 34 CFPs are concentrated in two provinces, Antananarivo and Toamasina, and 18 of the 26 LTPs are in three provinces, Antananarivo, Fianarantsoa, and Toamasina (Table 6.5). In certain provinces the public

Table 6.5
Number of Institutions and Students in Public Sector Vocational and Technical Education, Madagascar, 1990–91 and 1998–99

Program and province	1990–91		1998–99		
	Number of institutions	Number of students per institution	Trend in enrollments (1990 = 100)	Number of institutions	Number of students per institution
CFP					
Antananarivo	11	63	110	12	64
Antsiranana	3	86	68	4	44
Fianarantsoa	3	45	139	3	63
Mahajanga	3	9	182	3	17
Toamasina	8	42	87	9	33
Toliara	3	113	60	3	67
All Madagascar	31	58	94	34	49
LTP					
Antananarivo	8	369	112	8	414
Antsiranana	2	125	267	2	335
Fianarantsoa	6	197	105	5	248
Mahajanga	3	235	112	3	264
Toamasina	4	289	126	5	292
Toliara	2	445	113	3	335
All Madagascar	25	285	119	26	326

Source: Authors' estimates based on data from the METFP.

supply appears excessive in relation to the number of students. Mahajanga, for example, has three CFPs, each enrolling an average of only 17 students.

Diversity and specialization in the public system

Not only is the supply of public vocational/technical education, especially the CFPs, quite fragmented in relation to the demand; it is also poorly diversified. Of the CFPs, 75 percent offer training in only one or two specialties; 50 percent of the LTPs offer fewer than four (Table 6.6). Furthermore, few institutions, especially among the technical high schools, have a comparative advantage in their course offerings. On a scale from 0 to 100 (with 0 assigned to nonspecialized institutions and 100 to highly specialized institutions), the average rating for LTPs is 11 and that for CFPs is 6, suggesting a lack of specialization in both types of institution. Given the weak demand for vocational/technical education, the lack of specialization is inevitably costly and inefficient, since it implies that identical training programs, each enrolling just a few students, are offered by several institutions, while other training programs that may be more responsive to labor market needs, such as basic agricultural programs, are not offered in any of them. For example, 21 of 34 CFPs offer woodworking courses to a total of 400 students, averaging 20 pupils per institution; 3 LTPs offer "tertiary FTG" and enroll a total of 59 students (see Appendix table A6.2). Meanwhile, many courses, mainly in the CFPs, are offered in only one institution with very low enrollments. These include ceramics, decorative arts, and air conditioning, each of which enrolls fewer than 15 students.

Table 6.6
Course Offerings in Public Sector Vocational and Technical Institutions, Madagascar, 1998–99

Institutional profile	CFP	LTP	Both
Number of institutions offering			
1 field of study	10	1	11
2 fields of study	15	5	20
3 fields of study	7	8	15
4 or more fields of study	2	12	14
Total	34	26	60
Index of specialization[a]	16.5	11.3	11.8

a. The index of specialization measures the rarity of the courses offered by an institution. For a given institution i, the index is calculated as follows:

$$S_i = 100 \times \frac{\text{Min}_i (\Sigma_j D_j^i N_j)/n_i}{(\Sigma_j D_j^i N_j)/n_i}$$

where N_j is the number of institutions offering the field of study j, n_i is the number of fields of study offered in institution i, *and* D_j^i is equal to 1 if institution i offers field of study j and 0 otherwise. The index of specialization lies between 0 (nonspecialized institution) and 100 (highly specialized institution).
Source: Authors' estimates based on data from the METFP.

Production of Services in the Public Sector

Currently, fewer than 0.5 percent of the students in the second and third years of lower secondary school go on to short-cycle vocational training programs in the public sector (Table 6.7). The demand for courses in the CFPs at both levels I and II is thus very weak: in 1997 the CFPs attracted only 500 new entrants, and, even more alarming, the demand has been falling in recent years. Since the start of the 1990s, the number of entrants to CFPs has dropped by half. This decrease is evidence of an obvious loss of interest by students in the training offered, probably because of its poor linkage to the skills in high demand in the labor market. In 1998–99 CFPs enrolled 1,700 students, or about 16 percent of all students in public sector vocational/technical programs. Less than 5 percent of the students were in the service sector courses that were introduced in 1994; the rest were distributed fairly evenly among courses in civil and industrial engineering (although enrollments in the former stream have fallen by 30 percent since 1990).

The demand for places in the LTPs is stronger than that for places in the CFPs. About 15 percent of the students who obtained their BEPC in 1997 chose to continue their upper secondary education in an LTP. Even though the number of new entrants remains modest, on the order of 2,600 students in 1998, it has grown rapidly, if irregularly, in recent years. Moreover, since 1996 there have even been signs of renewed interest among students in this type of training. Currently, LTPs enroll a total of just

Table 6.7
Trends in Enrollments in Public Vocational and Technical Education, Madagascar, 1990s

	CFPs[a]						LTPs						
	New entrants		Total enrollments				New entrants		Total enrollments				
Year	Entry rate[b]	Number of entrants	Civil engineering	Industrial engineering	Services	Total	Entry rate[c]	Number of entrants	Civil engineering	Industrial engineering	Services	Agriculture	Total
1990–91	1.2	1,055	1,163	627	0	1,790	—	2,019	2,890	1,419	2,708	113	7,130
1991–92	0.6	436	378	386	0	764	11.6	2,008	3,003	1,326	2,110	51	6,490
1992–93	0.9	717	698	486	0	1,184	16.8	2,522	3,074	1,426	2,309	60	6,869
1993–94	0.8	609	496	520	19	1,035	12.9	2,515	2,060	1,515	1,458	47	5,080
1994–95	0.6	536	644	675	25	1,344	9.6	1,552	2,676	1,957	1,894	61	6,588
1995–96	0.9	740	656	725	24	1,405	12.4	2,067	2,741	1,971	1,960	61	6,733
1996–97	0.9	765	574	380	24	978	11.5	2,016	2,746	1,934	3,476	61	8,217
1997–98	0.6	503	832	783	59	1,674	11.7	2,678	3,446	2,431	2,528	72	8,477
1998–99	—	—	—	—	—	—	14.6	2,550	—	—	—	—	—

— Not available.
a. Includes students in CFP I and CFP II.
b. The entry rate is calculated by dividing the number of new entrants in CFPs in school year *t* by the number of students in grades 7 and 8 of lower secondary education in school year (*t* – 1).
c. The entry rate is calculated by dividing the number of new entrants in LTPs in school year *t* by the number of BEPC holders in school year (*t* – 1). The BEPC is the certificate obtained at the end of the lower secondary cycle.
Source: Authors' estimates based on data from the MINESEB and the METFP.

over 8,000 students, 70 percent of whom are in civil or industrial engineering and 30 percent in service sector programs. Enrollments in agriculture have fallen significantly, with a total of fewer than 80 students in 1998–99.

Regional disparities in access to public sector programs

Access to long-cycle vocational/technical education varies widely from region to region (Table 6.8). In Toliara 30 percent, and in Toamasina 23 percent, of the students who obtain their BEPC attend an LTP, compared with less than 9 percent in Antananarivo (where the share has even been declining). Several factors may account for such disparities. First, students from richer households are generally less likely to choose technical and vocational training, and the smaller share of lower secondary school graduates continuing on to the LTPs in Antananarivo may reflect the province's large share of higher-income families. The provincial disparities may also be linked to differences in training supply. In Antananarivo there is greater public-private competition in service delivery, creating more training options for students and dampening the demand for the LTPs.

The teaching staff

In 1998 public CFPs and LTPs employed 1,222 teachers, 14 percent more than they had eight years earlier (Table 6.9). Overall, the increase parallels the expansion of enrollments, but given that even in 1990 student-teacher ratios were already quite low—about 6 students per teacher in CFPs and fewer than 10 students per teacher in LTPs—the increase in teaching staff seems hardly justified. The average student-teacher ratio in the CFPs is currently half the corresponding ratio in the private sector, and the average ratio for LTPs is four-fifths the ratio for private sector institutions of the same type.

The average student-teacher ratio for the public sector hides substantial variation across institutions. Figure 6.2 illustrates this point. The relation between the number of students and the number of teachers is generally positive, but CFPs with the same staff strength can vary widely in enrollments—ranging between 10 and 70 students, for example, among the CFPs employing five teachers. Moreover, as shown in the regression results in Table 6.10, the differences in staffing do not seem to correlate with the diversity in course offerings, since for a given enrollment the number of courses offered has no significant impact on the student-teacher ratio. The process of staff

Table 6.8
Access to Public Vocational and Technical Education, by Province, Madagascar, 1991–92 and 1998–99

	CFP		LTP					
			1991–92			1998–99		
			New entrants			New entrants		
Province	1991–92 Total enrollment	1998–99 Total enrollment	Entry rate[a]	Number of entrants	Total enrollment	Entry rate[a]	Number of entrants	Total enrollment
Antananarivo	363	764	12.6	891	3,380	8.5	762	3,313
Antsiranana	154	175	—	—	—	18.9	230	669
Fianarantsoa	94	189	9.8	320	653	18.9	435	1,239
Mahajanga	23	51	18.6	163	532	15.3	210	791
Toamasina	106	293	10.5	304	753	23.2	476	1,459
Toliara	24	202	16.8	283	1,079	29.6	437	1,006

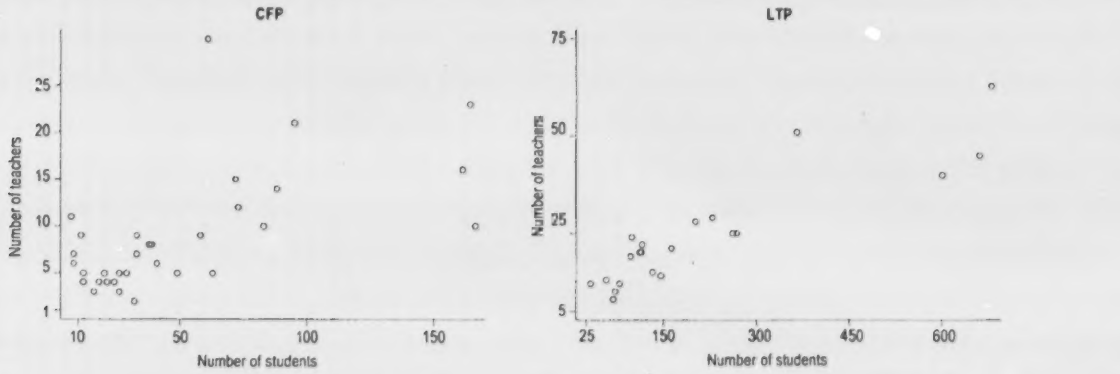
— Not available.
a. The entry rate is obtained by dividing the number of new entrants in the first grade of LTP during school year *t* by the number of BEPC holders in school year (*t* – 1).
Source: Authors' estimates based on data from the MINESEB and the METFP.

Table 6.9
Student-Teacher Ratios in Vocational and Technical Education, Madagascar, 1990–91 and 1998–99

	CFPs and CFP-type institutions		LTPs and LTP-type institutions		Total	
Sector and group	1990–91	1998–99	1990–91	1998–99	1990–91	1998–99
Public sector						
Students	1,790	1,674	7,130	8,477	8,920	10,151
Teachers	295	334	759	888	1,054	1,222
Student/teacher ratio	6.1	5.0	9.4	9.5	8.5	8.3
Private sector	**1996–97**		**1996–97**		**1996–97**	
Students	4,075		6,379		10,454	
Teachers	400		564		964	
Student/teacher ratio	10.2		11.3		10.8	

— Not available.
Source: Authors' estimates based on data from the METFP and on individual data from 1997 *Répertoire des Etablissements et Centres de Formation Technique et Professionnelle* and 1999 *Audit des Etablissements d'Enseignement Technique et Professionnel.*

Figure 6.2
Relation between Number of Teachers and Number of Students, Madagascar, 1999



Source: Based on 1999 *Audit des Etablissements d'Enseignement Technique et Professionnel.*

deployment that apparently allocates different numbers of teachers to otherwise similar institutions thus appears to be the main source of the disparities in staffing across institutions.

Nonteaching staff

The number of nonteaching staff in the public institutions appears to be excessive, accounting in 1998–99 for about 40 percent of all staff. On average, there is one nonteaching staff member for every 8 students in the CFPs and one for every 14 students in the LTPs (Table 6.11). The ratios vary widely from one institution to another: in almost half the CFPs and LTPs the ratio of students to nonteaching staff is less than the overall average, while in 10 percent of these institutions there are actually more administrative staff members than teachers.

Table 6.10
Regression Estimates of the Relation between Number of Teachers, Enrollments, and Diversity of Course Offerings, Vocational and Technical Education, Madagascar, 1999

Program	Intercept	Number of pupils	Number of fields of study	R^2	Number of observations
CFP	4.041	0.084	0.316	0.385	33
	(2.74)	(3.30)	(0.34)		
LTP	12.417	0.098	–2.33	0.819	26
	(3.88)	(3.98)	(1.19)		

Note: Linear model corrected for heteroscedasticity; numbers in parentheses are *t*-statistics.
Source: Authors' estimates based on data from 1999 *Audit des Etablissements d'Enseignement Technique et Professionnel.*

Table 6.11
Ratio of Students to Nonteaching Staff in Public Vocational and Technical Education, Madagascar, 1998–99

Indicator	CFP	LTP	Total
Total number of nonteaching staff	239	599	838
Nonteaching staff as a share of all staff (percent)	41.7	40.3	40.6
Student–nonteaching staff ratio (average across institutions)	8.3	14.3	11.0
Number of institutions with below-average student-teacher ratio	18	15	36
Number of institutions with more nonteaching staff than teachers	4	2	6
Memorandum: Total number of institutions	34	26	60

Source: Authors' estimates based on data from 1999 *Audit des Etablissements d'Enseignement Technique et Professionnel.*

Cost of service delivery

Using institution-level data from the 1999 *Audit des Etablissements d'Enseignement Technique et Professionnel* and the METFP's budget data, Table 6.12 presents unit cost estimates of the strictly teaching activities of the CFPs and LTPs. The data include salaries of teaching and nonteaching staff charged to the ministry's budget vote; salaries of personnel charged to the operating budgets of each institution; and other institutional operating expenses. The expenditures financed from the institutions' own income (for example, registration fees and the sale of products and services) are apparently also included in the estimates. The data indicate that public spending per student in the LTPs amounts to about FMG 1 million, which is comparable to the level of spending per student in general upper secondary education. One reason for the comparability in costs is the predominance of enrollments in business courses (which are generally less costly than other fields of study) in the technical high schools. In contrast, the CFPs have very high unit costs relative to the LTPs, averaging about FMG 1.85 million per student, or 1.8 times the unit cost of long-cycle technical programs, more than 4 times that of general lower secondary education, and 18 times that of primary education.

Information regarding the unit costs of lower-level vocational training in other countries is sparse, but the few available studies suggest that such programs are more costly in Madagascar than elsewhere. Table 6.13 shows the current unit cost of vocational/technical education in relation to the cost of general secondary education in selected countries. For countries other than Madagascar

Table 6.12
Current Unit Cost of Teaching Activities in CFPs and LTPs, Madagascar, 1998

Program	Unit cost (1998 FMG)	Unit cost as a multiple of unit cost in: Primary	Lower secondary	Upper secondary
CFP	1,848,700	18.08	4.47	1.97
LTP	1,041,400	10.18	2.52	1.11
Total	1,174,500	11.49	2.84	1.25

Note: Excludes in-service training activities.
Source: Authors' estimates based on data from the MINESEB and the METFP and 1999 *Audit des Etablissements d'Enseignement Technique et Professionnel.*

Table 6.13
Unit Costs of Vocational and Technical Education as a Multiple of Unit Costs of Secondary General Education, Madagascar and Selected Countries, 1980s and 1990s

Country	Vocational education	Technical education
AFRICA		
Sierra Leone	—	3.5
Somalia	1.2	2.3
ASIA		
Indonesia	—	1.5
Malaysia	2.8	2.6
Philippines	1.3	—
Thailand	2.6	4.2
LATIN AMERICA		
Chile[a]	1.5	—
Colombia	1.4	—
El Salvador	2.0	—
Honduras	7.2	—
Average	2.5	2.9
Madagascar	4.5	1.1

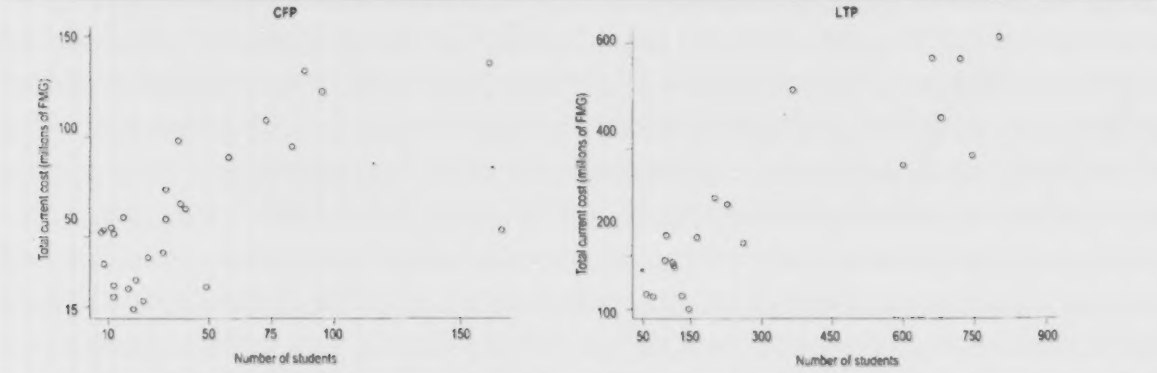
— Not available.
a. Refers only to municipal vocational schools; cost per graduate of vocational education relative to the cost per graduate of general secondary education.
Source: For Chile, Cox Edwards (2000); for Indonesia, Tzannatos and Sayed (2000); for Madagascar, data from Table 6.12; for other countries, Tsang (1989), as cited in Middleton, Ziderman, and Van Adams (1993).

shown in the table, vocational education is on average about 2.5 times costlier than general secondary education, and technical education is almost 3 times costlier. In Madagascar the unit costs of vocational education institutions relative to general education are almost 1.8 times higher than the average international norm, and they are up to 3.7 times higher than costs in some countries.

Consistent with the diversity across institutions in the allocation of teaching and nonteaching staff, unit costs are quite different from one institution to another. Figure 6.3 illustrates this heterogeneity. Using data from the METFP audit, the figure relates the current total cost of each institution (the sum of the cost of teaching and nonteaching personnel and of transfers from the central ministry to the institutions to cover operating costs) to the number of students enrolled. CFPs with roughly the same enrollments—say, 50 students—could incur total expenditures that differ by as much as a factor of 1 to 5. For the LTPs, total costs generally rise as the number of students increases, but here too, the spread in costs across institutions is wide.

Cost differences across institutions can be explained in part by differences in the type of training offered. As elsewhere, institutions that offer service sector programs (in Madagascar, mainly accounting courses) generally cost less than institutions with other course offerings (Table 6.14). This is especially true for LTPs, where service sector pro-

Figure 6.3
Relation between Total Current Cost and Number of Students Enrolled in Public Vocational and Technical Education, Madagascar, 1999



Note: Total current cost is cost of teaching and nonteaching personnel plus transfers from the central ministry to the institutions to cover operating costs.
Source: Based on 1999 *Audit des Etablissements d'Enseignement Technique et Professionnel.*

Table 6.14
Current Unit Cost by Field of Study, Madagascar, 1999
(thousands of 1999 Malagasy francs)

Field of study	CFP	LTP
Civil engineering	2,420.4	1,418.2
Industrial engineering	2,198.4	
Services	—	1,033.4
Agriculture	..	1,715.3

— Not available.
.. Not applicable.
Note: Estimated from a subsample of institutions delivering only one kind of program.
Source: Authors' estimates based on data from the METFP and from 1999 *Audit des Etablissements d'Enseignement Technique et Professionnel.*

grams are 20 percent less costly than civil engineering programs.

Nonetheless, even recognizing that differences in course offerings do affect the cost of service delivery, the small enrollments in the CFPs are in fact the main reason for their high costs. Given the weak demand, the excessive fragmentation of the system, and the resulting underutilization of capacity, these institutions are unable to take advantage of economies of scale in their operations. To evaluate the magnitude of the fixed costs, Table 6.15 shows regression estimates of total current costs as a function of the number of students enrolled. (The regressions are based on the same data as in Figure 6.3.) Fixed costs are roughly FMG 865,000 per student in the CFPs, or 55 percent of total cost per student, and only FMG 320,000 in the LTPs, or 31 percent of total cost per student.

The high fixed costs relative to total costs in these institutions imply that important economies of scale remain unexploited. For the CFPs a doubling of enrollments, which would bring them close to their full capacity, would raise total costs by only 45 percent, while for the LTPs a doubling of enrollments would raise total costs by an estimated 70 percent.

Any reorganization of the school map should obviously take advantage of the potential scale economies. Programs that are now being offered by several geographically proximate institutions (and with very few students at each of them) could be consolidated to advantage. The resulting savings from scale economies could be used to diversify course offerings and to establish a system of targeted financial aid to compensate students for any increase in travel and other private costs that such restructuring may entail.

Internal Efficiency of Vocational and Technical Education

In 1996–97, the last year for which complete data are available, out of a total enrollment of 1,400 students in public vocational education, only 273 graduated with a CFE/FP-I or CFE/FP-II certificate (Table 6.16). In technical education a steadily growing number of students take the optional exams for the *brevet d'agent d'exécution* (BAE) and the *brevet technique* (BT). Between 1984–85 and 1996–97 the

Table 6.15
Regression Estimates of the Relation between Total Cost and Size of Enrollments, Vocational and Technical Education, Madagascar, 1999

Program	Intercept	Number of students	R^2	Number of observations	Fixed costs per student: Thousands FMG	Fixed costs per student: Percentage of total unit costs	Returns to scale[a]
CFP	42,405.50 (4.0)*	701.0 (3.2)*	0.26	30	868.9	55.1	2.2
LTP	104,030.80 (3.9)*	651.9 (6.3)*	0.79	20	319.1	30.8	1.5

* Statistical significance at 1 percent.
Note: Linear cost function corrected for heteroscedasticity; figures in parentheses are *t*-statistics.
a. The cost function is $C = a + bE$, where C is total current cost and E is number of students. In this specification the intercept measures the fixed costs; the cost elasticity with respect to number of students is given by $\varepsilon = 1 - (a/C)$; and the returns to scale are equal to $\rho = 1/\varepsilon$.
Source: Authors' estimates based on data from 1999 *Audit des Etablissements d'Enseignement Technique et Professionnel.*

Table 6.16
Output of Graduates from Public Vocational and Technical Education, Madagascar, 1984–99

Program and certificate	1984–85	1994–95	1995–96	1996–97	1997–98	1998–99
CFP						
CFE/FP-I	—	—	—	109	85	—
CFE/FP-II	—	—	—	164	173	—
Total	—	—	—	273	258	—
LTP						
Compulsory exams						
Baccalauréat technique						
Civil engineering	561	315	469	540	280	490
Industrial engineering	486	221	406	339	355	458
Services	486	884	1,370	1,070	1,010	1,683
Agriculture	45	8	2	4	2	6
Total	1,578	1,428	2,247	1,953	1,647	2,637
Optional exams						
Brevet d'agent d'exécution	1,153	3,746	—	3,164	—	—
Brevet technique	833	2,264	—	2,167	—	—
Total	1,986	6,010	—	5,331	—	—

— Not available.
Source: METFP.

number of these diplomas awarded has more than doubled. The number of technical school students earning a *baccalauréat* has been rising steadily but nonetheless remains modest, on the order of 2,000 students in 1996–97 and 2,600 in 1998–99. In certain programs the output of graduates is much smaller than what would seem consistent with an economic scale of production. In particular, in 1995–99 the programs in agriculture produced only 14 graduates who received the *baccalauréat*.

One reason for the small number of graduates produced by the vocational/technical education system is that enrollments are small. The results, however, also reflect the high dropout rates and low examination pass rates. Of 100 entrants to the CFPs, we estimate that fewer than 40 obtain the *certificat de fin d'études*, while the other 60 drop out, most of them at the end of the first year (Table 6.17). The performance of the LTPs seems slightly worse, although survival rates are more difficult to estimate because some students probably leave the system after obtaining the BAE and the BT, given that their chances of success in these exams are better than for the *baccalauréat* (more than 50 percent versus only 30 percent). Ignoring this possibility and the associated self-selection, we estimate that among those who enter the LTPs, only about one-third eventually obtain the *baccalauréat*. An estimated three-quarters of the dropout occurs in the final year of study.

Although data constraints make it difficult to compare public and private institutions, the available information, while admittedly incomplete, suggests that private schools are probably more efficient in the pattern of student flow. On average, 31 percent of the candidates in public institutions pass the examination for the technical *baccalauréat*, while the rate among private schools (based, to be sure, on a limited sample of eight institutions in Antananarivo Province) is

Table 6.17
Internal Efficiency of Vocational and Technical Education, Madagascar, Late 1990s

Program	Examination pass rates (percent)		Follow-up of a cohort of new entrants in the public sector[a]				
					Length of studies (years)		
	Public sector	Private sector[b]	Dropout rate at the end of first year	Survival rate to end of cycle[c]	For those who graduate	For those who drop out	For the whole cohort
CFP[d]	71.3	—	51.6	38.9	2.2	1.0	1.6
LTP							
Compulsory exams							
Baccalauréat technique							
Civil engineering[e]	20.0	17.7	—	—	—	—	—
Industrial engineering[f]	24.9	32.6	—	—	—	—	—
Services[g]	40.0	68.6	—	—	—	—	—
Agriculture	16.7		—	—	—	—	—
Total[h]	30.7	39.6	4.4	35.4	3.5	1.9	3.3
Optional exams							
Brevet d'agent d'exécution	54.2	..	..	..	..	..	..
Brevet technique	52.5	—	—	—	—	—	—

— Not available.
.. Not applicable.
a. Assumes that students may repeat the same grade twice. Entrants to the CFP are the 1996 cohort; entrants to the LTP are the 1995 cohort.
b. Results are based on a sample of eight institutions located in Antananarivo.
c. Survival rate refers to pupils who reach and graduate from the last year of the cycle.
d. Average success rates in CFE/FP-I and CFE/FP-II exams in 1997–98.
e. Construction and public works only for the private sector.
f. For the private sector, the data refer only to *fabrication mécanique* and *fabrication electronique*.
g. For the private sector, the data refer only to *technique de secrétariat* and *technique de gestion*.
h. Weighted average for the public sector; simple average for the private sector.
Source: Authors' estimates based on data from the METFP.

about 40 percent. The same data show that average pass rates in the public and private sectors differ by almost 30 percentage points for service sector programs. While such gaps can, to some extent, be explained by differences in the type of student that each sector attracts, they nonetheless seem too wide to rule out better management in the private institutions as one source of the difference in performance.

Transition of Technical Education Graduates to Higher Education

One of the METFP's stated objectives for upper secondary technical education is to prepare graduates for technical studies in higher education. On the basis of the available information, an estimated 30 percent of each cohort of students in technical high schools obtains the *baccalauréat* and continues on to higher education (Table 6.18). As expected, that figure is lower than the 50 percent rate for students graduating from general secondary education, whose training is not explicitly intended to prepare them for entry into the work force. But it varies widely across disciplines, with a clear contrast between students in service sector programs, where the rate of entry into higher education is only 14 percent, and those in industrial programs, where the rate is 70 percent. Part of the

Table 6.18
Entry Rate of LTP Graduates into Higher Education, Public Sector Only, Madagascar, 1997–98

Diploma and field	Number of graduates (1997 exams)	Entry rate into higher education (1997–98)
Baccalauréat technique		
Civil engineering	339	15.1
Services	1,070	13.8
Industrial engineering	540	69.7
Agriculture	4	50.0
Total	1,953	29.6
Baccalauréat général	8,964	48.9

Source: Authors' estimates based on data from the METFP and the MINESUP.

Table 6.19
Distribution of New Entrants into Higher Education by Type of Program, Public Sector Only, Madagascar, 1997–98

	Type of program attended at university, 1997–98	
	Science[a]	Other programs
Type of *baccalauréat technique* (1997 exams)		
Services	0	100.0
Other fields of study[b]	46.2	53.8

a. Includes *instituts supérieurs de technologie* (ISTs).
b. Includes civil engineering, industrial engineering, and agriculture.
Source: Authors' estimates based on data from the METFP and the MINESUP.

disparity may reflect a stronger demand in the labor market for service sector skills.

Precise information with which to follow the schooling career of technical high school graduates who continue on to higher education is not available. Nonetheless, it is estimated that more than 50 percent of the university students with a *baccalauréat* in agriculture, industrial engineering, or civil engineering enroll in nonscience programs that bear little relation to their studies at the secondary level—primarily, law, economics, management, and sociology (Table 6.19). A reason for their choice of specialization may be that graduates of technical schools are less able than graduates of general secondary schools to compete for a place in the most selective university programs (*instituts supérieurs de technologie, écoles superiéures polytechniques,* Ecole Nationale d'Informatique, and others). The result can also be interpreted, however, as reflecting a lack of continuity between the curriculum in technical high schools and that in higher education. This problem obliges a significant number of students to switch their field of specialization after completing their secondary technical studies. Whatever the explanation, the lack of coherence between the curricula at the two levels suggests that the system's objectives are now only partly realized in that many of its graduates—produced at high cost, particularly in streams other than the service sector program—appear unable to build on the specialized technical training they received.

Conclusion

As currently organized, the public vocational/technical education system suffers from numerous flaws. Lower-level vocational programs offered by the CFPs attract very few students. Faced with weak demand, these institutions provide services at prohibitively high costs, which are further aggravated by the burden of an often excessive complement of administrative staff. The evidence presented raises serious questions about the spatial distribution of the network of public institutions, as well as the content of the programs and their responsiveness to the needs of the labor market.

It nonetheless remains true that given the current modest demand for lower secondary education, the vocational education system cannot, for the foreseeable future, hope to significantly increase enrollments. Some way must therefore be found to manage the costs of what is and will continue to be a small system. With regard to techni-

cal education, the situation is less critical, but the costs of these programs can undoubtedly also be reduced significantly. Currently, few public institutions enroll sufficient numbers of students to benefit from scale economies, and, moreover, their course offerings are restricted to a small number of specialties and are not very diverse. Some reforms will also be needed to enhance the coherence between the programs offered in technical secondary education and those offered in higher education and thus to enable graduates who do continue on to higher education to build on the specialization for which their technical training in high school prepared them.

Notes

1. The next section is based on various references, including CNFTP (1999); IBE (2000); Postlethwaite (1995); and UNDP (1999).

2. The phrase "lower-level training" or "lower-level program" is used to describe the education offered by CFP and CFP-type institutions.

3. Only holders of a CAP or a BT are included here because the household survey does not allow us to identify holders of other vocational/technical diplomas. In particular, it is impossible to compare the socioeconomic characteristics of holders of a technical *baccalauréat* with those of holders of a general *baccalauréat*.

4. Because of lack of data, these percentages relate the number of students in public vocational/technical programs to the total number of students enrolled in secondary education in both the public and private sectors.

7

Higher Education

The coverage of higher education is relatively limited in Madagascar at present, with a gross enrollment ratio of 2 percent compared with an average of about 5 percent in other low-income countries. Over the long term the sector can be expected to grow as the economy and the modern sector expand. There are more immediate challenges, however, pertaining to the way the system is organized for service delivery. This chapter documents the nature of some of these challenges by highlighting key features of the system, including its structure, the diversity of course offerings, institutional specialization, staffing patterns and arrangements for staff remuneration, the structure of unit costs across institutions and fields of study, the production of graduates, student flow efficiency, and arrangements for student finance. Comparisons between the public and private sectors are offered whenever the data allow.

In brief, we note that the government has made significant progress in recent years toward improving the performance of higher education. Of special note is that the size of the sector has been brought under control, student subsidization has been reduced, and private institutions have been allowed to enter the sector. Efforts are under way to reform higher education curricula and to adapt the course offerings to labor market needs. These advances notwithstanding, progress on several key issues is needed. Unit costs, which are generally high in the public universities, are exorbitantly high in some fields and institutions, reflecting an organizational structure that fails to take advantage of economies of scale in service delivery. Better personnel management is another important area for improvement, particularly with regard to such issues as excessive numbers of administrative staff at the various institutions, imbalances in the composition of the university teaching staff, and the apparent lack of discipline in staff remuneration for overtime teaching *(heures complémentaires)*. In addition, reforms in student finance need to continue, to encourage greater cost-consciousness in students' choice of field of study and to improve overall equity in education finance in the whole system. The nascent private sector also needs to be encouraged, both as a fiscally viable way to absorb the excess private demand for higher education and to diversify the sector to meet the demands of students with different needs.

Historical Context

Madagascar's system of higher education is relatively young; the University of Antananarivo was established only in 1960.[1] Over the past 40 years the public system's coverage has been extended to each province through the creation of colleges that were initially within the purview of the University of Antananarivo but that became independent universities in 1982. As the system spread geographically, enrollments grew at an unprecedented rate under the government policies of the 1980s. Encouraged by generous student aid, the number of students

quickly surpassed 40,000, plunging the system into deep crisis. By the beginning of the 1990s university campuses were being vandalized, falling increasingly under the control of individuals who for the most part had little in common with bona fide students other than the label. Conditions had deteriorated so badly that university teachers were even afraid to venture on campus. The system's internal efficiency was poor, with students often repeating the same year of study as many as five times. Student aid, considered an entitlement, encouraged permanent stays at the universities by "professional" students.

Faced with this untenable situation, the government took courageous measures to reform the system, including an unprecedented effort to bring enrollments under control. A system of preselection for entry into almost all university programs was put in place, with final selection determined on the basis of a review of the applications or by competitive examination. Flexibility in changing one's field of study in midstream was drastically reduced. Strict measures were taken to limit the excessive length of time students had been allowed to complete their courses; henceforth they were permitted to repeat only once in any given cycle of study. Along with the policies to regulate student flow, the Centre National de Télé-Enseignement de Madagascar (CNTEMAD) was created in 1992, mostly to cater to students excluded from traditional university programs.[2] Its establishment has undoubtedly helped facilitate the government's efforts to restructure higher education.

In order to revitalize higher education, the universities were granted autonomy in 1993 to manage their own academic, scientific, administrative, and financial affairs. However, the process has had its difficulties. Experience in the early years showed that the concept of autonomy, as officially defined, lent itself to diverse interpretations, frustrating the system's internal operations. With universities seeking to free themselves from certain common orientations and guidelines, it became increasingly difficult for the central ministry to monitor and supervise the institutions under its purview. To address these problems, the official provisions regarding the organization and operation of universities are currently being modified to clarify each party's role. These modifications would define the relation between the central ministry and the institutions as a contractual arrangement formalized through *contrats-programmes*. The contractual arrangement would make explicit the universities' objectives as stated in their plan for institutional development (Plan de Développement Institutionnel, PDI). These objectives obviously should be consistent with the Plan Directeur de l'Enseignement Supérieur (PDES, the master plan for higher education) and the Programme National pour l'Amélioration de l'Education (PNAE II, the national program for the improvement of education). While the articulation of the PDES and the PDI shows clear progress toward a more rational management of the system, in practice the documents remain by and large mere declarations of intention at this stage. Nonetheless, by linking the commitment of financing to explicit objectives the attainment of which is expected to be monitored and supervised, the proposed contractual arrangement could constitute a new stage in the development of the ministry's cost-management policy.

Substantial efforts have been made to increase the share of resources allocated to teaching and scientific activities, notably by shrinking the "welfare" component of expenditures and by reducing the excessive number of administrative personnel. To better respond to labor market needs, new short-term professional programs were put in place through the creation in 1992 of the *instituts supérieurs de technologie* (ISTs); "professionalized" programs were introduced in several universities beginning in 1995; and the curricula of some existing academic programs were modified. Provisions are currently being crafted to improve instructional quality through regular internal and external evaluation of the academic programs on offer. To this end, l'Agence Nationale d'Evaluation (AGENATE, the National Evaluation Agency) was created and became operational in 1999.

The reforms were not confined to the public sector. A legal framework governing private higher education was adopted in 1995, ending the public sector's monopoly on higher education. Although the change was adopted in a climate of political liberalization, it was also motivated by the increasing scarcity of places in public higher education in rela-

tion to the number of applicants. The legal framework certainly opened the way for the private sector, but the policy change came at a time when the broader economic context could hardly have been less auspicious for the expansion of private higher education. The devaluation of the Malagasy franc raised the cost of imported equipment substantially; given the generally limited resources available to the private institutions (which receive no state subsidy and benefit only occasionally from external aid), the result was to hold back the expansion of the sector.

Finally, reforms were implemented in 1996 to reinforce research, again employing the *contrats-programmes* mechanism. The recently approved texts on the subject foresee a complete reorganization of postgraduate studies, the setting up of *écoles doctorales*, and the institution of accreditation arrangements to supervise research activities, all of which would eventually facilitate training and career development for academic staff.

Structure of the Higher Education System

Systems of higher education are commonly classified into three broad categories according to the composition of the institutions: (1) undifferentiated public systems or "university systems" composed solely of public universities, (2) differentiated public systems made up of public institutions only, including a large number of universities, as well as nonuniversity institutions at the postsecondary level, and (3) differentiated systems that include both public and private institutions.[3] In developing countries most systems of higher education belong to the first category; 60 percent of them are composed solely of state universities (World Bank 1995). Madagascar's system is an exception. The reforms undertaken since 1990 have replaced a previously homogeneous block of public universities with a set of highly diversified and hierarchical institutions. The university faculties, the *écoles* and *instituts* attached to the universities, and the ISTs coexist with the Centre National de Télé-Enseignement de Madagascar (the national center for distance learning) and with a growing number of private institutions.

As in most developing countries, higher education in Madagascar attracts a large proportion of high school graduates. Today, around 80 percent of each graduating class of high school students continues on to higher education, compared with 83 percent in 1987, suggesting that the rate has remained relatively stable over the period (Table 7.1). Consistent with what is observed at the secondary level, university students come disproportionately from the wealthiest families; our estimates based on the 1997 *Enquête Prioritaire auprès des Ménages* indicate that 80 percent of those in higher education come from the richest 25 percent of households. Gender gaps in access are relatively small. In 1998–99, 47 percent of students in public higher education in Madagascar were women, compared with an average of 31 percent for Sub-Saharan Africa (USAID 2000).

The reforms in higher education since 1990 thus do not appear to have held back upper secondary school graduates' transition to higher education. Instead, their main impact has been to bring about profound changes in the structure of demand for higher education, altering the relative sizes of the various parts of the system. The introduction of preselection for programs in the universities reduced the share of enrollments in these programs from 100 to 56 percent, in less than 10 years. Today these faculties account for no more than 58 percent of the students in higher education, compared with 92 percent in 1990. Meanwhile, the share of students in the professional schools (*écoles* and *instituts*) has risen from 8 to 10 percent.

Many of those excluded from the traditional university sector—about 40 percent in each entering freshmen class—are channeled to the distance learning system, which currently accounts for about a quarter of all higher education enrollments. Because of its limited course offerings and high cost, the private sector attracts just over 4 percent of the entering freshmen. With 2,000 students, the sector still accounts for but a small share of total enrollments (about 7 percent), although there has been significant growth in recent years. The private sector in Madagascar is far smaller than in such countries as Bangladesh, Brazil, Colombia, Indonesia, the Republic of Korea, and the Philippines, where more than 60 percent of the students in higher education attend a private school (World Bank 1995).

Table 7.1
Entry Rates to Higher Education and Trends in Enrollments by Sector, Madagascar, 1987–99
(percent, except as indicated)

	New entrants		All students								
Indicator	1987–88	1997–98	1985–86	1990–91	1992–93	1993–94	1994–95	1995–96	1996–97	1997–98	1998–99
Transition rate of *baccalauréat* holders[a]	83.0	80.5	..	..	..	..	..	..	..	..	..
Distribution of enrollments by sector	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Public sector	100.0	95.9	100.0	100.0	100.0	100.0	100.0	98.3	—	95.2	93.1
Universities	100.0	55.9	100.0	100.0	77.8	73.7	71.7	70.0	—	67.6	67.6
Faculties[b]	—	—	88.5	91.9	71.5	66.4	63.6	61.7	—	58.2	57.9
Ecoles and instituts	—	—	11.5	8.1	6.3	7.3	8.0	8.3	—	9.4	9.7
IST	..	0.6	0.0	0.0	0.4	1.0	1.4	1.3	—	1.2	1.2
CNTEMAD	..	39.3	0.0	0.0	21.8	25.2	26.9	27.0	—	26.4	24.2
Private sector	..	4.1	0.0	0.0	0.0	0.0	0.0	1.7	—	4.8	6.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of students	..	..	37,475	35,824	42,681	36,527	30,698	29,727	—	31,250	30,060
Public sector	..	..	37,475	35,824	42,681	36,527	30,698	29,232	27,535	29,749	27,974
Private sector	..	..	0	0	0	0	0	495	—	1,501	2,086

— Not available.
.. Not applicable
Note: Numbers may not add up to totals because of rounding.
a. Number of nonrepeating upper secondary school leavers who obtain the *baccalauréat* in a given year relative to the number of nonrepeating first-year entrants in higher education the previous year.
b. Law, economics, management, and sociology (DEGS), arts, sciences, and medicine.
Source: Authors' estimates based on data supplied by the MINESUP, supplemented by data from Thomas (1996) and UNESCO (1999a).

The university faculties

The university faculties offer programs in law, economics, management, and sociology (abbreviated as DEGS), arts, sciences, and medicine. The courses are organized by academic cycles, each of which culminates in certification by a diploma. The first cycle, two years in duration, leads to the *diplôme d'enseignement universitaire général* (DEUG). The second cycle, also two years long, leads to the *licence* (at the end of the third year) and the *maîtrise* (end of the fourth year). Finally, the third cycle, an option only in certain programs, leads to the *diplôme d'études approfondies* (DEA) and to the *doctorat*, the highest degree. Since the reforms introduced in 1990, admission to a university faculty is based on review of applications or on competitive examination. Beginning in 1995 programs leading to professional diplomas were established in certain universities. There are today nine such programs: three in management, one in the arts, and five in the sciences.[4] Admission to these programs (which last from two to four years depending on entry requirements) is generally based on competitive examination after completion of certain prerequisite studies in the relevant academic programs or of the *baccalauréat*.

The university faculties enroll more than 17,000 students, of whom 40 percent are in the DEGS programs, 20 percent in the sciences, 24 percent in the arts, and 15 percent in medicine (Table 7.2). A remarkable trend in recent years has been the strong growth in the demand for DEGS courses; between 1996 and 1997, the number of students in those fields rose by 1,300, while enrollments in the other

Table 7.2
Trends in Enrollments in the University Faculty Sector, Including the "Professionalized" Programs (*Formations Professionnalisantes*, FP), Madagascar, 1985–99

	DEGS		Sciences		Arts			Total	
Year	Total	Of which FP	Total	Of which FP	Total	Of which FP	Medicine	Total	Of which FP
1985–86	11,891	..	8,388	..	7,322	..	5,561	33,162	..
1990–91	11,025	..	7,917	..	8,787	..	5,179	32,908	..
1992–93	9,663	..	7,815	..	7,860	..	5,168	30,506	..
1993–94	6,982	..	6,069	..	5,850	..	5,361	24,262	..
1994–95	5,974	..	4,771	..	4,990	..	3,804	19,539	..
1995–96	5,983	..	4,622	..	4,629	51	3,115	18,349	51
1996–97	5,746	26	3,459	24	3,974	29	3,161	16,340	79
1997–98	7,074	50	3,412	212	4,321	65	3,387	18,194	327
1998–99	7,073	52	3,598	238	4,218	35	2,520	17,409	325

.. Not applicable.
Note: DEGS denotes law, economics, management, and sociology.
Source: MINESUP.

disciplines remained stable or declined markedly. The "professionalized" programs established in 1995 account for less than 1 percent of the enrollments in DEGS and the arts and barely 7 percent of those in the sciences. In 1997–99, while overall university enrollments remained relatively stable, the demand for the "professionalized" courses barely increased, and demand even dropped noticeably in the arts. This trend seems to indicate that many of these new programs respond poorly to the needs of the labor market. In the absence of a system for assessing the demand for professional qualifications and skills, universities undoubtedly have great difficulty in determining in a rational manner what new types of program to establish.

The distribution of course offerings across university faculties is highly unbalanced. With close to 12,000 students and 20 different programs, the University of Antananarivo alone accommodates 67 percent of all students enrolled in the sector (Table 7.3). At the other end of the spectrum, the University of Antsiranana has only 400 students enrolled in merely two programs. What is even more striking is the limited degree of specialization in course offerings across institutions. Thus, compared with faculties elsewhere, those at Antsiranana, Toliara, and even Toamasina appear to have no comparative advantage in any particular discipline. This lack of specialization is inevitably costly because it means that course offerings are duplicated at different locations, with some sites enrolling very few students.

This fragmentation in the system is particularly notable in the arts and sciences. In these disciplines the programs of study are in abundant supply in relation to the demand for them (e.g., in history, philosophy, mathematics, and physics and chemistry), and in certain universities they currently attract fewer than 100 students (see Appendix table A7.1). It might therefore be appropriate to reconfigure the "university map" to rationalize the supply of academic programs across universities. At the same time, the creation of new academic programs at the universities should be carefully evaluated, taking into account both the current supply of courses and the demand for them. Both these cost-management measures would need to be assessed as part of a national rather than a regional plan, along with a redefinition of the student aid policy to address equity concerns.

Table 7.3
Characteristics of Course Offerings in the University Faculty Sector, Madagascar, 1998–99

Indicator	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara	Total
Number of fields	20	2	4	3	6	7	42
Index of specialization[a]	100	53	91	84	75	68	
Number of students	11,699	400	1,483	1,171	1,706	950	17,409
Students per field							
Average number	585	200	371	390	284	136	414
Minimum number	32	174	63	49	52	66	32
Maximum number	2,464	226	1,149	852	690	315	2,464

a. The index of specialization measures the rarity of the courses offered by an institution. For a given institution i, the index is calculated as follows:

$$S_i = 100 \times \frac{\text{Min}_i \left(\Sigma_j D_j^i N_j\right)/n_i}{\left(\Sigma_j D_j^i N_j\right)/n_i}$$

where N_j is the number of institutions offering the field of study j, n_i is the number of fields of study offered in institution i, and D_j^i is equal to 1 if institution i offers field of study j and 0 otherwise. The index of specialization lies between 0 (nonspecialized institution) and 100 (highly specialized institution).
Source: Authors' estimates based on data supplied by the MINESUP.

Ecoles supérieures and *instituts* attached to the universities

The *écoles* and *instituts* offer training programs that prepare graduates for high-level positions in agronomy (Ecole Supérieure des Sciences Agronomiques, ESSA), engineering (*écoles supérieures polytechniques*, ESPs), information technology (Ecole Nationale d'Informatique, ENI), marine sciences (Institut Halieutique des Sciences Marines, IHSM), orthodontics (Institut d'Odontologie-Stomatologie Tropicale de Madagascar, IOSTM), and teaching (*écoles normales supérieures*, ENSs, and Ecole Normale Supérieure pour l'Enseignement Technique, ENSET). Admission to these schools is by competitive examination. The programs generally consist of one academic cycle lasting five years, although some schools such as ENI grant an intermediate diploma after two years of study. Some institutions, including the ESPs, offer postgraduate programs. A little under 3,000 students are enrolled in the sector (Table 7.4); since 1990, when the reforms in higher education were put in place, enrollment in these schools has remained remarkably steady. More than 40 percent of the students are enrolled in ESPs, 30 percent in ENSs and ENSET, and 16 percent in ESSA, with the rest divided among ENI, ISHM, and IOSTM.

With a total of 10 institutions, 3 of which are in Antananarivo, this sector consists of small institutions, each enrolling an average of 300 students (Table 7.5). But the overall figure hides significant differences; the *écoles* and *instituts* of Antananarivo average 660 students each and are much bigger than those elsewhere. (The University of Toliara's two institutions of this kind average 65 students each.) The course offerings are generally very specialized. In the case of the ESPs (two institutions) and the ENSs (three institutions), there appear to be too many institutions in relation to total enrollments. For example, with only one program (philosophy), the ENS at Toliara has fewer than 50 students (see Appendix table A7.1). The ESP at Antsiranana has fewer than 60 students, on average, per academic discipline. Some of these students, such as those following courses in electronics, actually attend classes at the ESP at Antananarivo (see Appendix table A7.1).

Instituts supérieurs de technologie (ISTs)

The ISTs, which were created in 1992, offer two-year courses that respond directly to the demand for skills in the labor market. Students gain admission by competitive examination following the *baccalauréat*. Fewer than 400 students are enrolled in the various programs (Table 7.6). Enrollments have

Table 7.4
Number of Students in *Ecoles Supérieures* and University *Instituts*, Madagascar, 1985–99

Year	ESSA	ESPs	ENI	IHSM	IOSTM	ENSs	ENSET	Total
1985–86	233	2,434	140	..	351	1,118	37	4,313
1990–91	381	1,176	166	10	176	955	52	2,916
1992–93	474	1,092	157	12	170	741	50	2,696
1993–94	475	1,081	151	70	168	649	81	2,675
1994–95	481	1,044	151	41	131	518	92	2,458
1995–96	483	1,069	153	34	136	463	121	2,459
1996–97	486	1,163	131	34	146	539	132	2,631
1997–98	481	1,287	113	65	135	650	138	2,924
1998–99	477	1,234	96	84	142	741	140	2,914

.. Not applicable.
Note: See text for abbreviations; see also Abbreviations and Acronyms section.
Source: MINESUP.

Table 7.5
Characteristics of Course Offerings in *Ecoles Supérieures* and University *Instituts*, Madagascar, 1998–99

	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara	Total
Number of *écoles* and *instituts*	3	2	2	1	0	2	10
Number of fields[a]	25	9	5	1	..	3	43
Index of specialization[b]	100	95	93	100	..	100	..
Total enrollment	1,981	411	250	142	..	130	2,914
Students per institution							
Average number	660	205	125	142	..	65	291
Minimum number	477	140	154	142	..	46	46
Maximum number	963	271	96	142	..	84	963
Students per field							
Average number	79	46	63	142	..	43	68
Minimum number	6	7	32	142	..	30	6
Maximum number[c]	282	69	96	142	..	54	282

.. Not applicable.
a. Number of fields across all institutions in the sector.
b. For definition of index of specialization, see Table 7.3. Figures refer to the average index of specialization across all *écoles* and *instituts*.
c. Excludes students enrolled in *troncs communs* (common core courses), where these exist.
Source: Authors' calculations based on data supplied by the MINESUP.

Table 7.6
Enrollments in ISTs by Field, Madagascar, 1992–99

Year	Industrial engineering	Civil engineering	Services	Total
1992–93	46	52	75	173
1993–94	140	101	141	382
1994–95	—	—	—	433
1995–96	—	—	—	393
1996–97	136	122	173	431
1997–98	126	97	148	371
1998–99	135	101	137	373

— Not available.
Source: MINESUP.

remained largely stable, although they appear to have declined slightly in recent years.

Two ISTs, at Antananarivo and at Antsiranana, specialize in separate fields, with no duplication between them (Table 7.7). However, the scale of their operations is very different: the IST at Antsiranana offers only two specialties, compared with six in the IST at Antananarivo, and enrolls fewer than 90 students, suggesting that it is probably not operating on a scale that would permit service delivery at a reasonable cost.

Centre National de Télé-Enseignement de Madagascar (CNTEMAD)

The CNTEMAD has 20 regional centers and operates with no permanent teaching staff. The arrangements in distance learning differ from those in the traditional universities in that students are allowed to repeat each year of their studies. Most of these students attend full time; only 11 percent of them report holding a job at the same time.[5] Since its creation, the CNTEMAD's enrollment has declined by about 20 percent (Table 7.8), and the institution now has approximately 7,000 students. The programs offered are relatively undiversified, with, until recently, only two options, law and management. In 1998–99 three professional programs in the service sector were introduced, with apparent success, since they attracted more than one-third of the total CNTEMAD enrollment. The growth of these programs took place at the expense of courses that students have abandoned in droves—business,

Table 7.8
Enrollments in Distance Education by Field, Madagascar, 1992–99

Year	Law	Management	Service sector programs[a]	Total
1992–93	6,634	2,672	..	9,306
1993–94	5,554	3,654	..	9,208
1994–95	5,104	3,164	..	8,268
1995–96	5,153	2,878	..	8,031
1996–97	5,319	2,814	..	8,133
1997–98	5,063	3,197	..	8,260
1998–99	2,446	2,207	2,626	7,279

.. Not applicable.
a. These programs lead to the *diplôme technique supérieur.*
Source: MINESUP.

Table 7.7
Characteristics of Course Offerings in ISTs, Madagascar, 1998–99

IST	Number of fields	Index of specialization[a]	Number of students	Students per field		
				Average number	Minimum number	Maximum number
Antananarivo	6	100	284	47	45	51
Antsiranana	2	100	89	45	44	45
Total	8	100	373	47	44	51

a. For definition of index of specialization, see Table 7.3.
Source: Authors' estimates based on MINESUP data.

information technology management, and effective communication in French.

Private higher education

The first private institution opened its doors in 1983, but it was only after the mid-1990s that private higher education began to expand, following the adoption of government policies regarding the overall organization of the private sector. In 1998–99, 17 private institutions were accredited by the MINESUP, a sharp increase from the 6 that existed in 1995–96 (Table 7.9). Private higher education currently enrolls about 2,000 students, four times the enrollment in 1995–96.

Virtually all the private institutions are located in Antananarivo.[6] Most of them offer short courses, typically two years in length, focused on vocational skills. An important part of the program is on-the-job internships, which constitute, on average, 25 percent of total course time.[7] Students gain admission to the private institutions through competitive examination after obtaining the technical or general *baccalauréat*. Successful completion of studies at these institutions generally leads to certification with a *brevet de technicien supérieur*. Enrollment fees average about FMG 1.2 million a year (1999 prices) but vary considerably among institutions.[8] Most private institutions are small, averaging 120 students and two specialties, although the largest of them enroll almost 400 students and offer up to six separate programs.

Table 7.9
Characteristics of Private Higher Education, Madagascar, 1983–99

	Number of institutions	Number of students
1983–84	1	—
1995–96	6	495
1997–98	10	1,501
1998–99	17	2,086
Courses of study offered		
Agriculture and livestock	1	79
Commerce, management, and business administration	8	830
Tourism	4	187
Health	1	76
Informatics and electronics	3	262
Electromechanical engineering, mechanics, and industrial maintenance	3	106
Public works, architecture, and interior decoration	3	240
Other	2	306
Students per institution 1998–99		
Average number	123	
Minimum number	25	
Maximum number	373	
Fields offered per institution 1998–99		
Average number	2	
Minimum number	1	
Maximum number	6	

— Not available.
Source: For 1983–84, Thomas (1996); for 1995–96, authors' estimates based on Thomas (1996); for other years, MINESUP.

Higher Education Staff

The total number of permanent Malagasy-national teachers in the public sector (universities, *écoles* and *instituts*, and ISTs) rose from 811 in 1990–91 to 940 in 1998–99, an increase of 16 percent over nine years (Table 7.10). This increase, which might seem sizable, in fact barely offset the massive departures in the mid-1990s of foreign university teachers. The increase in teaching staff appears not to be coordinated with the policies put in place in the early 1990s to regulate student flow. As a result, the student-faculty ratio decreased significantly, from 38 students per teacher in 1990 to 22 in 1998.

The overall student-faculty ratio conceals significant disparities. Because of their small enrollments and structured teaching arrangements, ratios in the *écoles* and ISTs average barely more than 10 students per teacher (Table 7.11). Some university programs, especially those that enroll few students and are rel-

Table 7.10
***Number of Permanent* Teaching Staff in Public Higher Education, Madagascar, 1990–99**

Year	Nationals	Foreigners	Total	Number of students	Student-teacher ratio
1990–91	811	128	939	35,824	38.2
1992–93	782	43	825	33,375	40.5
1993–94	855	44	899	27,319	30.4
1994–95	885	44	929	22,430	24.1
1995–96	834	25	859	21,201	24.7
1996–97	925	20	945	19,402	20.5
1997–98	932	16	948	21,489	22.7
1998–99	940	13	953	20,695	21.7

Note: Includes teachers in university faculties, *écoles* and *instituts*, and ISTs.
Source: Authors' estimates based on MINESUP data.

atively fragmented, also have small student-teacher ratios; the average ratio for the sciences is about 13. Private sector institutions, which are more or less comparable in size to the *écoles* and the ISTs, have about 17 students per teacher. An important feature of the private sector is the widespread use of temporary staff. In 1995, for example, 90 percent of the teachers in the private sector were temporary (Thomas 1996). Most of them were undoubtedly moonlighting from the public sector.

In public higher education, few teachers are in the senior echelons. Among university staff, those with the ranks of *assistant* and *maître de conférence* (roughly at the level of junior and senior assistant professors) make up, respectively, 44 and 40 percent of the staff, while those with the ranks of *professeur* and *professeur titulaire* (roughly at the level of associate and full professors) make up 9 and 8 percent (Table 7.12). There are, however, significant differences across universities: 86 percent of the staff in the *professeur titulaire* and *professeur* categories teach at the University of Antananarivo, while some universities, such as those at Toliara and Antsiranana, have only one full professor on the staff (and in both cases they were recruited only recently). The overly steep pyramid in the composition of teaching staff is detrimental to research activities and constrains the supervision of doctoral-level training, compromising the career development of younger staff.

Remuneration for overtime teaching *(heures complémentaires)*

Over and above their normal teaching load, teachers in the public sector put in extra time to run classes and supervise the work of interns, postgraduate students, and certain other students. The rate at which overtime teaching is paid remained unchanged for years. In 1998–99 it was raised significantly in nominal terms, but in real terms it still falls short of what it was eight years ago (Table 7.13). Nonetheless, in relation to trends in the base salary of university teachers, the increase in the rate for overtime teaching is considerable. Between 1992 and 1998 base salaries rose only 0.7 percent in nominal terms, while the rate for overtime jumped by 160 percent. With the implied erosion in the standard of living, overtime teaching became an important source of supplemental income for university teachers, motivating them to put in as many extra hours as possible—often at the expense of their regular teaching and research duties and, in all probability, encouraging fraud and other unacceptable behavior.

Because of lack of information, it is not possible to evaluate for the most recent period the impact of the rate increase on universities' total spending on overtime teaching services. Considering only trends during 1992–98, for which data are available, the overall number of overtime hours rose by 18 percent, with notable differences across universities (Table 7.14). The increase, which was especially large at the universities of Mahajanga (99 percent) and Antsiranana (53 percent), can undoubtedly be explained by the general shortage of permanent teaching staff and is in a sense a natural response to the hiring freeze that had been in effect since 1992. At the same time, the creation of new "professionalized" programs and the modification of certain courses to respond to labor market needs almost certainly added to the increased use of overtime teaching.

The evidence nonetheless suggests that a nonnegligible share of the extra hours is in fact diverted from the intended purpose. To take only

Table 7.11
Student-Faculty Ratio by Field, Madagascar, 1990–91 and 1998–99

Type of institution	1990–91 Students	1990–91 Teachers	1990–91 Student-faculty ratio	1998–99 Students	1998–99 Teachers	1998–99 Student-faculty ratio
Public sector[a]						
University faculties	32,908	514	64.0	17,409	568	30.6
DEGS	11,025	78	141.3	7,073	86	82.2
Sciences	7,917	224	35.3	3,598	272	13.2
Arts	8,787	156	56.3	4,218	153	27.6
Medicine	5,179	56	92.5	2,520	57	44.2
Ecoles and instituts	2,916	297	9.8	2,914	340	8.6
ESSA	381	27	14.1	477	42	11.4
ESPs	1,176	159	7.4	1,234	155	8.0
ENSs	955	90	10.6	741	91	8.1
ENSET	52	—	—	140	8	17.5
ENI	166	8	20.8	96	12	8.0
IOSTM	176	11	16.0	142	17	8.4
IHSM	10	2	5.0	84	15	5.6
IST	..	..	..	373	32	11.7
Total public sector	35,824	811	44.2	20,696	940	22.0
			1997–98			
Private sector[b]	—	—	—	1,501	86	17.5

— Not available.
.. Not applicable.
Note: See text for abbreviations; see also Abbreviations and Acronyms section. DEGS, law, economics, management, and sociology.
a. Includes only nationals on the teaching staff.
b. Includes permanent and temporary teachers.
Source: Authors' estimates based on MINESUP data.

one example, in 1997–98 the number of extra hours was four times the normal teaching load of the permanent staff (Table 7.15). In total, the volume of overtime teaching was the equivalent of the cost of 3,500 permanent teachers working the normal load. If all the extra hours were actually spent on teaching, the ratio of students to faculty would be extremely low, ranging from two to seven (full-load equivalent) students per staff across the universities. These rates are much too low and raise obvious questions about the current arrangements for managing the system of *heures complémentaires*. As envisioned by the ministry, closer monitoring and supervision, combined with an upper limit on the amount of overtime teaching that any teacher could perform, would certainly be needed to help stabilize a situation that is at risk of further deterioration following the recent increase in rates for overtime teaching. To illustrate, if the volume of overtime in 1997–98 (325,751 hours) had been paid at the average rate in 1998–99 (FMG 16,125 an hour in nominal terms, or FMG 14,674 an hour in constant prices), spending on overtime would represent 28 percent of the total compensation of all

Table 7.12
Distribution of Permanent Teaching Staff by Grade and by University, Madagascar, 1995–99
(percent)

Year and university	*Professeur titulaire*	*Professeur*	*Maître de conférence*	*Assistant*	*Collaborateur technique*	Total		Student-teacher ratio
						Number	Percent	
1995–96								
Antananarivo	9.5	9.0	43.7	33.0	4.8	581	100.0	25.9
Antsiranana	0.0	0.0	41.4	53.4	5.2	58	100.0	14.2
Fianarantsoa	1.9	0.0	32.1	56.6	9.4	53	100.0	31.8
Mahajanga	0.0	8.2	34.4	49.2	8.2	61	100.0	25.2
Toamasina	0.0	2.8	36.1	52.8	8.3	36	100.0	46.6
Toliara	0.0	0.0	42.1	53.9	3.9	76	100.0	16.6
Total	6.5	6.7	41.7	39.7	5.4	865	100.0	25.4
1998–99								
Antananarivo	12.1	10.4	43.8	33.7	0	596	100.0	23.0
Antsiranana	1.6	4.8	50.0	43.6	0	62	100.0	13.1
Fianarantsoa	3.1	4.7	28.1	64.1	0	64	100.0	27.1
Mahajanga	10.3	3.4	39.7	46.6	0	58	100.0	22.6
Toamasina	2.4	0.0	46.3	51.3	0	41	100.0	41.6
Toliara	2.2	0.0	52.8	44.9	0	87	100.0	12.4
Total	9.3	7.8	43.8	39.1	0	908	100.0	22.4

Source: Authors' estimates based on MINESUP data.

Table 7.13
Rate of Remuneration for Overtime Teaching Hours, Madagascar, 1992–2000

Year	GNP deflator (base 1998)	Hourly rate[a]		Monthly base salary of teachers in higher education[b]	
		Current FMG	Constant FMG	Current FMG	Constant FMG
1992–93	31.3	6,148	19,675	258,558	826,063
1997–98	91.7	6,148	6,707	—	—
1998–99	100.0	16,125	16,125	260,449	260,449
1999–2000	105.2	16,125	15,327	—	—
Change, 1992–98 (percent)		+162.3	–18.0	+0.7	–68.5

— Not available.
a. The rate of remuneration for overtime teaching varies according to the salary grade of the teacher; the rates shown here are averages.
b. Refers to the average base salary of public sector higher education teachers in salary grades 8, 9, and 10.
Source: Authors' estimates based on data from the MINESUP and the MBDPA.

Table 7.14
Number of Overtime Teaching Hours in Public Universities, Madagascar, 1992–98

Year	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara	Total
1992–93	176,792	20,448	22,360	10,675	15,932	29,391	275,597
1993–94	167,732	24,627	19,141	13,426	7,828	24,584	257,337
1994–95	194,340	16,426	18,194	11,658	29,002	23,566	293,186
1995–96	141,744	27,623	6,946	16,314	16,486	24,624	233,737
1996–97	—	24,608	18,558	—	15,065	28,177	—
1997–98	214,211	31,280	16,296	21,244	16,136	26,584	325,751
Change, 1992–93 through 1997–98 (percent)	+21.2	+53.0	–27.1	+99.0	+1.3	–9.6	+18.2

— Not available.
Note: The number of extra teaching hours is calculated by dividing the budget allocated for this item by the average rate of remuneration for the extra hours.
Source: Authors' estimates based on MINESUP data.

Table 7.15
Teaching Hours, Overtime, and Student-Faculty Ratio in Public Universities, Madagascar, 1997–98

Indicator	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara	Total
Hours of teaching							
1. Normal load of permanent staff[a]	56,200	5,275	5,175	5,425	3,875	7,775	83,725
2. Overtime teaching (number of hours)[b]	214,223	31,282	16,297	21,245	16,137	26,585	325,769
3. Total	270,423	36,557	21,472	26,670	20,012	34,360	409,494
Percentage of overtime teaching[c]	79.2	85.6	75.9	79.7	80.6	77.4	79.6
4. Number of permanent staff	594	59	59	58	44	89	903
5. Average normal load of permanent staff[d]	95	89	88	94	88	87	93
6. Overtime expressed in normal load equivalent[e]	2,858	409	245	285	227	393	4,417
7. Number of students	14,201	859	1,809	1,390	1,529	1,125	20,913
Student-faculty ratio							
With faculty counted as normal-load equivalents[f]	5.0	2.1	7.4	4.9	6.7	2.9	4.7
With faculty counted as number of permanent staff[g]	23.9	14.6	30.7	24	34.8	12.6	23.2

a. The estimate takes into account the composition of the staff at each university by grade and their corresponding normal teaching loads: 125 hours a year for *professeurs titulaires* and *professeurs*, 100 hours for *maîtres de conférence*, and 75 hours for *assistants*.
b. Computed by dividing total expenditure on overtime teaching at each university by the rate at which overtime is remunerated.
c. Overtime as a share of total number of hours of teaching ([1]/[3]).
d. Average number of hours of teaching per staff regardless of grade ([1]/[4]).
e. Total number of hours of teaching (normal load plus overtime) converted to normal-load equivalent on the basis of the average number of hours in a normal load ([3]/[5]).
f. Takes into account both overtime teaching (converted into normal-load equivalents) and number of teachers on the permanent staff ([7]/[6]).
g. Takes into account only the normal teaching load of the permanent teaching staff ([7]/[4]).
Source: Authors' estimates based on MINESUP data.

permanent university teachers, compared with 12 percent based on the previous rate.

Nonteaching staff

Madagascar's universities employ four times as many administrative and technical staff (*personnels administrifs et techniques*, PATs) as teaching staff. The implied ratio of students to nonteaching staff is on the order of 6, while in the private sector the ratio exceeds 15 (Table 7.16). The number of PATs is excessive at all the universities, but it is especially so at Antsiranana and Antananarivo.

Despite the chronic surplus of PATs, which puts a severe strain on the budget for higher education, their number has declined very little over time, falling by only 15 percent between 1990 and 1999 (Table 7.17). Paradoxically, there has even been new recruitment in recent years, although an incentive package (with a separation benefit equivalent to 18 months' salary) was put in place in 1996 to encourage voluntary departure by these staff. Even allowing for the possibility that the incentives were perhaps too modest to motivate departures on a large scale, especially in light of the sluggishness of the economy and the lack of alternative employment, there is no doubt that the unattractiveness of the separation package was not the only reason for the stagnation of the number of PATs.

Internal Efficiency of Higher Education

In 1997 Madagascar's public higher education system produced 3,700 graduates (not including those obtaining DEUGs or Ph.D.s). This was 17 percent more than in 1990 (Table 7.18), even though total enrollments were smaller by 40 percent. As a result of the reforms during the 1990s, however, the number of graduates fell considerably in certain disciplines. In 1997 only 300 medical doctors graduated from the universities, 46 percent less than in 1990, and there were 200 science graduates, 70 percent less than seven years earlier. Over the same period the number of graduates from the *écoles* (which train high-level technicians) fell by 18 percent, a decline that the creation of the ISTs has helped reverse. Finally, in the university faculties, few students in the arts or sciences graduate at the *maîtrise* level. Among the rea-

Table 7.16
Number of Administrative and Technical Staff in Public and Private Higher Education, Madagascar, 1998–99

Institution	Number of PATs	Ratio of students to PATs	Ratio of PATs to permanent teaching staff
University			
Antananarivo	2,486	5.5	4.2
Antsiranana	216	3.8	3.5
Fianarantsoa	239	7.3	3.7
Mahajanga	154	8.5	2.6
Toamasina	288	5.9	1.4
Toliara	191	5.7	2.2
Total	3,574	5.7	3.9
IST	70	5.3	2.2
CNTEMAD	93	85.7	..
Private institutions (school year 1997–98)	98	15.3	—

— Not available.
.. Not applicable.
Note: PATs, *personnels administrifs et techniques.*
Source: Authors' estimates based on MINESUP data.

Table 7.17
Number of Administrative and Technical Staff in Universities, Madagascar, 1990–99

Year	Number	Change from previous year	Ratio of students to PATs
1990–91	4,146		8.6
1991–92	—	—	—
1992–93	3,688	–458[a]	9.0
1993–94	3,709	+21	7.3
1994–95	3,709	0	5.9
1995–96	3,618	–91	5.7
1996–97	3,493	–125	5.4
1997–98	3,607	+114	5.8
1998–99	3,574	–33	5.7

— Not available.
Note: PATs, *personnels administrifs et techniques.*
a. Change from 1990–91.
Source: Authors' estimates based on MINESUP data.

Table 7.18
Number of Graduates from Public Higher Education, Madagascar, 1990–91 and 1996–97

Program	1990–91	1996–97
University faculty		
DEGS		
Licence	783	302
Maîtrise	199	611
Total	982	913
Sciences		
Licence	421	132
Maîtrise	228	66
Total	649	198
Arts		
Licence	469	429
Maîtrise	36	72
Total	505	501
Medicine	571	307
Total	2,707	1,919
Ecoles		
ESSA	21	59
ESP	177	172
ENS	127	92
ENSET	18	8
ENI	61	34
IOSTM	49	16
IHSM	10	..
Total	463	381
IST	..	182
CNTEMAD	..	1,243
Total	3,170	3,725

.. Not applicable.
Note: For abbreviations, see text; see also Abbreviations and Acronyms section. The total number of graduates does not include those receiving the two-year university DEUG or the Ph.D.
Source: MINESUP.

sons are the small difference in labor market earnings between graduates with a *licence* and those with a *maîtrise*, which hardly motivates students to take the trouble to get the higher degree, and the poor prospects for continuing to postgraduate studies after the *maîtrise*, given the scarcity of such programs, which are not even offered at some universities.

The policies adopted at the start of the 1990s helped bring about profound changes in public higher education. In particular, they led to a considerable reduction in the number of repeaters, thereby improving the system's internal efficiency. In the university faculties the share of repeaters fell from almost 42 percent in 1989–90 to a little over 20 percent in 1997–98 (Table 7.19); over the same period the corresponding share in the *écoles* declined from about 17 to 8 percent. But compared with the private sector, with less than 1 percent repeaters, and despite preselection for entry to the public sector, the rates of repetition remain high, implying that the costs associated with repetition continue to be significant.

In the university faculties, more than a third of each entering cohort drops out after finishing only the first year of courses (Table 7.20), while 40 percent, on average, reaches the third year *(licence)* and less than 30 percent reaches the final year of the second cycle (*maîtrise* or sixth year in medicine).[9] The *écoles* and the ISTs, which admit students on the basis of a competitive examination, have a better yield. Even so, there is substantial variation within the subsector: survival rates in the ESPs, ESSA, and the ISTs range between 70 and 92 percent, whereas the other institutions achieve poorer results, with a survival rate to the fifth year of only about 50 percent. The CNTEMAD has very low internal efficiency: close to 80 percent of all entrants drop out at the end of the first year; only 9 percent obtain the *licence;* and 5 percent obtain the *maîtrise.*

Unit Costs in Higher Education

Table 7.21 shows the current cost per student and per graduate by type of study in public higher education. The figures refer to actual spending by the different institutions expressed in 1999 prices.[10] Expenditures include salaries of teaching staff paid from the MINESUP's budget vote, salaries of nonteaching staff paid from the budgets of the individ-

Table 7.19
Number of Students and Repeaters in Public and Private Higher Education, Madagascar, 1989–90 and 1997–98

Type of institution	1989–90			1997–98		
	Number of students	Number of repeaters	Percentage of repeaters	Number of students	Number of repeaters	Percentage of of repeaters
Universities						
Faculties	33,303	13,870	41.6	18,164	4,053	22.3
Ecoles	3,743	630	16.8	2,869	221	7.7
Total	37,046	14,500	39.1	21,033	4,274	20.3
IST	..	..	..	371	7	1.9
CNTEMAD	..	..	..	7,974	1,285	16.1
Private institutions	—	—	—	1,501	9	0.6

— Not available.
.. Not applicable.
Source: Authors' estimates based on MINESUP data.

ual institutions, the cost of overtime teaching services, and other teaching-related operating costs They exclude spending on institution-level central administration *(rectorat)*, spending on student welfare, scholarships managed by each institution, and the cost of running the *baccalauréat* examinations (which are normally organized by the universities). The data include expenses financed against the institutions' own income (for example, enrollment fees, contractual services, and the sale of products). Such spending, however, is generally modest, averaging about 8 percent of the total spending net of salaries charged to the MINESUP's budget vote. The exception is the CNTEMAD, which draws a nonnegligible share of its resources from the sale of pedagogical materials to students.

Unit costs in the university faculties vary greatly across fields, ranging from approximately FMG 500,000 in the DEGS programs to a little over FMG 2 million in science, where the student-faculty ratios are markedly lower than in other fields. The *écoles* and ISTs, which generally enroll very few students, have much higher unit costs, averaging about FMG 4 million. While it is true that their students drop out and repeat less frequently than elsewhere in the system, the cost of producing each graduate is nonetheless considerable, on the order of FMG 29 million for an ENS graduate and more than FMG 27 million FMG for an ENI graduate. (The percentage of grantholders at ENI is much larger than in the other *écoles;* see Table 7.26.) Enrollment fees are high for students in ENI (about FMG 600,000 a year), but for all other students in the subsector the fees cover, on average, no more than 2 percent of the unit costs, less than the corresponding percentage in the university faculties. Finally, not only does distance learning have a very low level of internal efficiency, but its unit costs are also relatively high compared with those in other countries. (As noted, only a portion of these costs is financed by the state.) The cost per student at the CNTEMAD is 68 percent of the unit cost of university DEGS programs, which offer similar content in a different format, and the cost per graduate is 74 percent as high. These ratios are much higher than the corresponding ratios in China, the Republic of Korea, Pakistan, and Thailand (Table 7.22).

Little information is available on the cost structure of private institutions. The estimates presented in Table 7.23 refer to data for 1994–95 for five of the six private institutions that were accredited at the time. The expenditures include the salaries of permanent and nonpermanent instructors and of nonteaching staff, and current expenses on overhead for the institutions. Capital spending is excluded, as it was in the unit cost estimates for public institutions.

Table 7.20
Schooling Career of a Cohort of Entrants to Public Higher Education, Madagascar, 1996–97

Program	Dropout rate, first year	Survival rate[a]		Average duration of studies (years)		
		To end of third year	To end of final year	Graduates	Dropouts	All in the cohort
Faculty						
DEGS	29.7	43.8	35.8	4.5	1.8	2.8
Sciences	47.4	25.1	16.6	4.5	1.7	2.1
Arts	33.1	50.5	25.2	4.7	2.2	2.8
All (average)	36.7	39.8	25.9	4.6	1.9	2.6
Medicine	40.1	..	33.0	6.4	1.7	3.3
Ecoles* and *instituts						
ESSA	9.0	..	87.9	5.0	1.4	4.6
ESP	14.4	..	69.6	5.3	1.7	4.2
ENS	0.5	..	58.9	5.5	3.2	4.5
ENSET	30.0	..	47.4	5.3	1.6	3.4
ENI	38.9	..	55.5	5.2	2.2	3.9
IOSTM	2.8	..	55.5	5.2	3.2	4.3
All (average)	15.9	..	53.2	5.3	2.2	4.2
IST	8.2	..	91.5	2.0	1.0	1.9
CNTEMAD	77.9	8.5	4.6	4.9	1.3	1.5

.. Not applicable.
Note: For abbreviations, see text; see also Abbreviations and Acronyms section.
a. The calculation of the survival rates assumes that students repeat only once in a given cycle except for those enrolled in the CNTEMAD, for whom the calculation allows repetition of each year of study.
Source: Authors' estimates based on MINESUP data

The unit cost of private institutions is less than 50 percent as high as that of the ISTs, which offer short training programs similar to those run by private sector institutions. Admittedly, private schools rely heavily on temporary instructors, which greatly reduces their costs, but they also tend to operate with higher student-faculty ratios than the ISTs. Fees from students cover only 51 percent of costs, with the balance financed by income from the production and sale of goods, financial support, gifts, and sometimes even income from other teaching activities, notably at the secondary education level.

Student Grants

In 1998 spending on student grants in public higher education represented 13.7 percent of current expenditures (excluding salaries) of the MINESUP, compared with almost 21 percent in 1990 (Table 7.24). The decrease is consistent with the government's policy of reallocating resources progressively toward teaching activities. However, while the budget for student aid is clearly declining (it fell by 70 percent in constant terms between 1990–91 and 1998–99), the share of grant-receiving students among all students in the public system has risen

Table 7.21
Unit Costs in Public Higher Education, Madagascar, Late 1990s

Type of institution	Cost per student (thousands of 1999 FMG)[a]	Annual enrollment fees (FMG)[b]	Rate of cost recovery (percent)[c]	Average number of years to graduate[d]	Cost per graduate (thousands of FMG)[e]
University faculty					
DEGS	497	59,800	12.0	4.5	2,251
Arts	1,215	47,400	3.9	4.7	5,686
Sciences	2,166	47,500	2.2	4.5	9,838
Medicine	1,044	80,000	7.7	6.4	6,682
All	1,135	58,675	6.4	5.0	5,718
Ecoles* and *instituts					
ESSA	2,832	52,500	1.9	5.0	14,191
ENS	5,290	57,500	1.1	5.5	29,099
ENSET	1,585	35,000	2.2	5.3	8,357
ESP	3,325	65,000	2.0	5.3	17,591
ENI	5,189	600,000	11.6	5.2	26,883
IHSM	7,129	25,000	0.4	..	..
IOSTM	3,972	65,000	1.6	5.2	20,456
All	3,804	150,000	3.9	5.2	19,910
IST	4,792	—	—	2.0	9,728
CNTEMAD	341	—	—	4.9	1,677

— Not available.
.. Not applicable.
Note: FMG, Malagasy francs. For abbreviations, see text; see also Abbreviations and Acronyms section.
a. See accompanying text for the components of spending included in the unit cost calculation.
b. Enrollment fees paid by students vary across universities and cycles of study. The amounts here are the average fees for a student in the first and second cycles of studies in higher education (explained in the section "The university faculties," above).
c. Share of unit cost defrayed by enrollment fees.
d. From Table 7.20.
e. The cost per graduate is obtained by multiplying the cost per student by the average number of years that a student takes to graduate.
Source. Authors' estimates based on MINESUP data.

considerably, from about 53 percent in 1990 to more than 70 percent in 1998. The student aid system thus appears to be "drifting" in the sense that although the average grant amount is now much smaller, having declined by about 40 percent in real terms since 1990, the number of grantholders shows signs of uncontrolled increase.

Even though the value of the grants has declined, they remain very generous. On average, the ministry currently spends on each grantholder the equivalent of one-third of the cost of each university place (Table 7.25). Put another way, total spending on student grants is equivalent to the cost of 4,000 places, or approximately one-fifth of current enrollments in traditional higher education. This is a substantial amount, considering that students in higher education come from the wealthiest levels of society. Further comparisons underline the relative size of the grants: the average grant that a student in public higher education receives is about twice the

Table 7.22
Unit Costs in Distance Education and Traditional Higher Education, Madagascar and Selected Developing Countries

Country	Cost per student	Cost per graduate
Madagascar, 1998[a]	68.7	74.1
China, 1981	50.0	—
Korea, Rep. of, 1981	10.0	—
Pakistan, 1988	21.9	—
Thailand, 1982	—	14.1

— Not available.
a. Cost of CNTEMAD relative to the cost in the DEGS faculties (law, economics, management, and sociology).
Source: For countries other than Madagascar, Lockheed, Middleton, and Nettleton (1991).

Table 7.23
Unit Costs in Private Institutions, Madagascar, 1994–95

Item	Thousands of 1999 FMG
Cost per student[a]	2,354
Annual fees[b]	1,199
Rate of cost recovery (percent)[c]	51.0
Cost per student as share of cost per IST student (percent)	49.1

Note: Data are for five institutions: EPSA Belavala, Collège Saint-Michel, Sainte Famille-Infocentre, ESCA, and Universel Formation. FMG, Malagasy francs.
a. The expenditures included in the computation of unit costs are salaries of permanent and nonpermanent instructors and of nonteaching staff, and current expenses on overhead for the institutions. Capital spending is not included.
b. Average fees per student per year.
c. Share of unit costs defrayed by student fees.
Source: Authors' estimates based on Thomas (1996).

Table 7.24
Spending on Student Aid, and Number of Students in Higher Education Receiving Grants, Madagascar, 1990s

	Expenditure (million FMG)[a]					Number of grantholders		
Year	Current prices	Constant (1998) Amount	Constant (1998) Trend	As percentage of current spending of MINESUP[b]	Average value of a grant (1998 prices)	Number	Trend	As percentage of all students
1990–91	6,981.3	29,139.3	100	20.9	1,536,476	18,965	100	52.9
1992–93	6,805.9	21,779.0	74.7	23.2	1,252,961	17,382	92	52.1
1993–94	5,824.5	16,445.6	56.4	16.4	1,172,007	14,032	74	51.4
1994–95	7,129.2	14,258.4	48.9	19.6	973,004	14,654	77	65.3
1995–96	7,121.8	9,767.0	33.5	18.0	648,495	15,061	79	71.0
1996–97	7,011.0	8,208.0	28.2	15.8	585,491	14,019	74	72.4
1997–98	9,161.9	9,994.7	34.3	18.3	694,272	14,396	76	67.6
1998–99	8,863.7	8,863.7	30.4	13.7	598,213	14,817	78	72.2

a. Excludes scholarships for study abroad; includes scholarships and allocations for the budget item "equipment."
b. Excludes remuneration of personnel paid against the MINESUP's budget vote.
Source: Authors' estimates based on MINESUP data.

monthly starting salary of a primary school teacher, or 10 times the fees that students pay to enroll.

Even if the value of the grants is reduced to more modest levels, a system that provides financial assistance to a large share of the students in higher education is not only inequitable but also inefficient. Such a system tends to stimulate enrollments across all fields, including those in which job prospects for graduates are not particularly bright. In certain university programs, such as the arts, the

Table 7.25
Student Grants in Public Higher Education in Relative Terms, Madagascar, 1997

Indicator	Grant amount (FMG)	Grant amount as a multiple of the indicated reference
Average value of a grant	598,213	
Public spending per public higher education student (university only)	2,101,701	0.3
Annual enrollment fees in public higher education (university only)	58,675	10.2
Monthly pay of a starting primary school teacher in salary grade 2	293,959	2.0

Source: Authors' estimates based on data from the MINESUP and the MBDPA.

Table 7.26
Share of Grantholder Students by Field, Madagascar, 1990–91 and 1998–99

Type of institution	1990–91 (1)	1998–99 (2)	(2) – (1)
University faculty			
DEGS	59.0	71.8	12.8
Arts	42.8	68.5	25.7
Sciences	54.7	71.7	17.0
Medicine	51.3	64.8	13.5
Ecoles* and *instituts			
IOSTM	73.9	83.1	9.2
ESP	61.5	93.3	31.8
ENS and ENSET	71.6	86.6	15.0
ENI	47.6	100.0	52.4
IHSM	—	46.4	—
IST	..	99.7	..

— Not available.
.. Not applicable.
Note: For abbreviations, see text, see also Abbreviations and Acronyms section.
Source: Authors' estimates based on MINESUP data.

share of grantholders rose by 26 percent over the 1990s (Table 7.26), but the main source of employment for the graduates—the civil service—reached the saturation point several years ago. In the *école* and IST sector, the share of grantholders in the ENSs and ENSET has grown by 15 percent since 1990, benefiting more than 86 percent of the students today, whereas technical high schools (where ENSET graduates are normally destined to teach) are currently not acutely short of teachers. A system that distributes financial aid so widely, and for fields of study in which the demand for graduates is still modest, is hardly compatible with efforts to boost external efficiency.

Conclusion

The supply of public higher education is quite diversified, but in the university faculty sector the program offerings are often highly fragmented across institutions, preventing the system from taking advantage of scale economies in service delivery. Unit costs in the *école* and IST sector are generally very high because of low enrollments, and the high costs are defrayed to only a limited extent by the fees paid by students. "Professionalized" programs, created recently as a way of making courses more responsive to the needs of employers, are also very costly because they attract so few students. The universities have no way to anticipate the needs of the job market in any precise manner, which makes it very difficult for them to manage student intake into the various university faculties and *écoles*.

With regard to the teaching staff, the public system faces two major problems: (a) the small size of the senior ranks, which frustrates the management of the system, as well as staff renewal and research activities, and (b) the inefficient management of the system of *heures complémentaires*, under which claims for overtime teaching have expanded without clear justification based on instructional needs. The complement of nonteaching staff remains excessive despite the (probably insufficiently attractive) incentive packages that were offered for voluntary departures. Finally, while spending on student aid has been reduced significantly, the number of grantholders has grown rapidly, benefiting what seems to be an excessive share of the students, considering that

access to higher education is still the privilege of a socially favored minority.

Notes

1. This section is based on various sources, including IBE (2000); Madagascar (1997a); Postlethwaite (1995); Thomas (1996); UNDP (1999); and Viens and Lynch (2000).

2. It should be noted that the CNTEMAD was not created solely to regulate the current flow of students. It was also intended to serve students who for various reasons find it impossible to follow courses involving face-to-face instruction, such as nursing mothers, housewives, and the physically handicapped. The available data contain insufficient information to evaluate the share of such students in all enrollments.

3. This typology and definitions are borrowed from World Bank (1995).

4. The programs are as follows: management courses at the Institut Supérieur Professionnel de Gestion (ISPF), Centre Automatisé de Gestion (CAG), and Centre de Formation Entrepreneuriale (CFE); a course in the arts at the Département Interdisciplinaires et de Formation Professionnelle (DIFP); and courses in the sciences at Unité de Formation Professionnalisante (UFP), Maîtrise d'Informatique et de Statistiques Appliquées (MISA), Technicien Supérieur en Sciences de la Terre (TSST), Mathématiques et Informatique pour les Sciences Sociales (MISS), and Institut des Sciences et Techniques de l'Environnement (ISTE).

5. Other than this characteristic, practically nothing is known about students who enroll in distance education in terms of their educational and family backgrounds, their schooling career, or their subsequent professional life.

6. The exceptions are one school in Fianarantsoa and one in Mahajanga.

7. Authors' estimate based on Thomas (1996); refers to the average in 1996 for five of the six private MINESUP-accredited institutions.

8. Authors' estimate of fees based on Thomas (1996); estimate reflects average fees for five of the six institutions accredited by MINESUP in 1996.

9. These figures do not take into account the possibility that failing students switch to another field of study, but under the new rules the options for doing so are limited.

10. The source figures are for 1998 except for certain universities (notably Antananarivo) for which the data other than those pertaining to the salaries of teaching staff are based on spending in 1995.

8

Education and the Labor Market

The preceding chapters focused on various aspects of Madagascar's education system and its immediate outcomes. In this chapter we consider the external efficiency of the country's investment in education and its link to skills development in the labor force. The issues concern both the *flow* of graduates from the education system into the labor market and the quality of the entire *stock* of the labor force. Is the output of educated labor from the various levels of the education system sufficiently responsive, in terms of its volume and quality, to the demand for skills in a modernizing economy? How prevalent is skills development in the labor force? What is its interaction with workers' prior educational attainment? What are the costs of in-service training, and what impact does this training have on economic productivity?

Madagascar has a serious problem in the undereducation of its work force. The only remedy is to ensure that all children enter the education system and that they exit it with a minimum of basic education and training. Today, nearly 140,000 young people each year, of the roughly 300,000 in each birth cohort, begin their working lives equipped with fewer than five years of education, and 60,000 have never even been to school. Moreover, the skills deficit of the work force has worsened significantly in recent years, and many youths will have difficulty in making up for their lack of basic skills. Left uncorrected, the general deterioration of human capital could seriously compromise the country's prospects for economic growth.

Although the output of postprimary graduates appears largely consistent with the labor market's absorptive capacity for educated labor, within this overall balance there is evidence of an overproduction of higher education graduates and, to a lesser extent, of graduates from technical secondary education. The resulting competition for employment forces many of the most educated to take jobs for which they are overqualified. This in turn pushes those with less education lower down the job ladder—often into unstable employment and economic precariousness, and eventually into poverty.

Beyond the problem of overproduction in higher education, the course curricula in the public universities are not sufficiently responsive to the needs of modern business. The curriculum reforms currently under way therefore need to continue apace even as the volume of enrollments is carefully managed to match the rate of job creation in the modern sector.

Employment, Income, and Returns to Education

This section highlights some key features of Madagascar's economy and trends in the structure of employment. It presents estimates of wage differentials by educational attainment and discusses the pattern of returns to education.

Structure of employment

Between 1993 and 1999, the labor force grew by about 28 percent, well above the growth rate of the

population as a whole (Table 8.1). The unemployment rate rose only slightly during the period and remains modest despite the sluggishness of the economy; no more than 8 percent of the economically active population is unemployed or looking for a first job. Although total employment has expanded at a remarkable pace, the nonformal sector, and agriculture in particular, continue to dominate the economy. Self-employment has therefore been the main avenue for job creation in Madagascar. Employment in the modern sector, especially in salaried positions, is relatively low and has been expanding more slowly than employment in other sectors. These features are consistent with the rising level of poverty in recent years and with the apparent deterioration of skills in the work force.

Table 8.1
Trends in the Economically Active Population, Madagascar, 1993 and 1999

Indicator	1993	1999
Population age 10 and above (thousands)	8,299.7	10,045.4
Population in the labor force (thousands)	5,299.7	6,844.2
Employed population (thousands)	4,949.1	6,310.1
Labor force participation rate (percent)	63.9	68.1
Unemployment rate (percent)	6.6	7.8

Source: 1993 *Recensement Général de la Population et de l'Habitat*; authors' estimates based on 1999 *Enquête Prioritaire auprès des Ménages*.

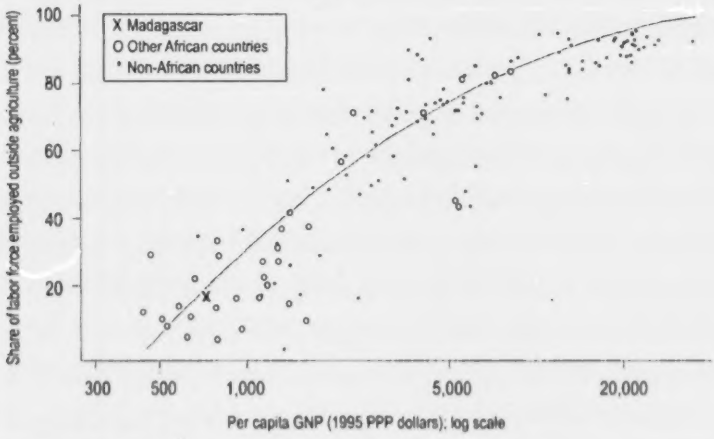
A large traditional sector with few industrial jobs. According to the 1999 *Enquête Prioritaire auprès des Ménages*, an estimated 85 percent of the labor force worked in the nonformal sector, and nearly 75 percent was employed in agriculture (Table 8.2). Although large in absolute terms, the size of the agriculture sector is consistent with Madagascar's level of economic development (Figure 8.1). Industry is relatively undeveloped and thus offers few job prospects for graduates. Only 5 percent of the work force is employed in the industrial sector, and less than 3 percent works in the modern industrial sector. Jobs in industry are concentrated in microen-

Table 8.2
Distribution of Employment by Sector, Madagascar, 1993 and 1999

	1993		1999					
			Formal sector		Informal sector		Total	
Sector	Thousands of workers	Percentage of work force	Thousands of workers	Percentage of work force	Thousands of workers	Percentage of work force	Thousands of workers	Percentage of work force
Civil service[a]	149.8	3.0	176.9	2.6	..	..	176.9	2.6
Agriculture	4,024.2	81.3	223.5	3.5	4,532.3	71.9	4,755.8	75.4
Industry	257.4	5.2	165.5	2.6	153.4	2.5	318.9	5.1
Energy	5.9	0.1	9.1	0.1	2.5	0.1	11.6	0.2
Public works	39.9	0.8	26.7	0.4	17.2	0.3	44.0	0.7
Transport and communications	61.9	1.3	56.3	0.9	277.0	0.4	84.0	1.3
Commerce and services	236.2	4.8	195.1	3.1	290.6	4.6	485.7	7.7
Other	173.5	3.5	62.0	1.0	370.9	6.8	432.9	6.9
Total	4,949.1	100.0	915.4	14.5	5,394.7	85.5	6,310.1	100.0

.. Not applicable.
Note: Data are for employed population age 10 and above.
a. Public administration, defense, social security, education, and health.
Source: 1993 *Recensement Général de la Population et de l'Habitat*; authors' estimates based on 1999 *Enquête Prioritaire auprès des Ménages*.

Figure 8.1
Relation between Per Capita GNP and Share of Labor Force outside Agriculture, Madagascar and Other Developing Countries, 1995



Note: GNP, gross national product; PPP, purchasing power parity.
Source: Based on data in ILO (1999) and in World Bank SIMA database.

terprises; half of the formal sector industrial firms have fewer than 5 employees, and only 3 percent employ more than 100 workers. The introduction of tax-free zones in 1990 undoubtedly helped stimulate the sector, but the contribution of industry to GDP remains modest, at less than 10 percent in 1996 (see Appendix table A8.1). During 1993–99 Madagascar's economy became increasingly tertiarized; service sector firms employed about 8 percent of the total work force in 1999, compared with less than 5 percent in 1993. Of the 1.4 million jobs created between 1993 and 1999, 18 percent were in the service sector, less than 5 percent were in industry, barely 2 percent were in the civil service, and 20 percent were in agriculture. Apparently, the demand for and supply of education responded as expected to this trend in employment. As described in Chapters 6 and 7, enrollment in service sector courses in technical high schools and in higher education has expanded significantly during the past few years.

A rising share of self-employment. The expansion of overall employment has been accompanied by a significant rise in self-employment. Of the approximately 1,400,000 jobs created between 1993 and 1999, 36 percent were held by self-employed workers, 47 percent were accounted for by unpaid family workers, and only 18 percent were salaried jobs. (A third of the salaried jobs were temporary.) Even though salaried employment grew by more than 40 percent between 1993 and 1999, it still represents only 15 percent of all jobs. Jobs requiring the highest level of educational qualification—those in management—constitute less than 3 percent of the total (Table 8.3).

Structure of earnings and returns to investment in education

The available information permits an evaluation of income differentials only for wage earners. According to the 1999 *Enquête Prioritaire auprès des Ménages,* these wage gaps are relatively large: a civil servant earns, on average, 3.2 times as much as a wage earner in the informal sector, and a formal sector salaried worker earns 2.7 times as much. It is, of course, true that employees in the informal sector are less well educated; the average for these workers is five years of schooling, versus nine years for those in the formal sector (Table 8.4).

Given these disparities in earnings, we would expect relatively high returns to investments in education. Table 8.5 shows estimates of the returns

Table 8.3
Distribution of Employment by Type, Madagascar, 1993 and 1999

	1993		1999					
			Formal sector		Informal sector		Total	
Type of job	Thousands of workers	Percent	Thousands of workers	Percent	Thousands of workers	Percent	Thousands of workers	Percent
Salaried jobs								
Executives	—	—	171.9	18.8	3.8	0.1	175.8	2.8
Skilled workers	—	—	325.1	35.5	106.0	2.0	431.1	6.8
Unskilled workers	—	—	43.0	4.7	99.6	1.8	142.6	2.3
Others	—	—	62.3	6.8	104.9	2.0	167.3	2.7
Total	639.0	13.1	602.5	65.8	314.4	5.8	916.9	14.5
Temporary	205.5	32.2	120.1	19.9	182.0	57.9	302.1	32.9
Other jobs								
Apprentices	7.0	0.1	2.5	0.3	10.6	0.2	13.2	0.2
Employers	2,662.8	53.8	11.9	1.3	22.3	0.4	34.2	0.5
Self-employed			212.1	23.2	2,934.2	54.4	3,146.3	49.9
Unpaid family workers	1,544.1	31.2	85.1	9.3	2,101.6	39.0	2,186.7	34.7
Others	96.0	1.9	1.1	0.1	11.3	0.2	12.5	0.2
Total	4,949.1	100.0	915.4	100.0	5,394.7	100.0	6,310.1	100.0

— Not available.
Note: Data are for economically active population age 10 and above.
Source: 1993 *Recensement Général de la Population et de l'Habitat*; authors' estimates based on 1999 *Enquête Prioritaire auprès des Ménages.*

Table 8.4
Salaries of Wage Earners in the Formal and Informal Sectors, Madagascar, 1999

Sector	Average annual salary (thousand FMG)	Years of schooling
Formal sector		
Civil service	3,985.4	10.3
Other	3,190.9	7.8
Total	3,395.1	8.8
Informal sector	1,257.9	4.5
Total	1,969.7	7.4

Source: Authors' estimates based on 1999 *Enquête Prioritaire auprès des Ménages.*

Table 8.5
Rates of Return to Education, Madagascar, 1999

Rate of return	Percent
Average[a]	6.9
By educational attainment[b]	
Primary	5.3
Lower secondary	8.4
Upper secondary	8.9
Higher education	13.1

a. Coefficient on the variable on years of schooling in the earnings functions (see Appendix table A8.2).
b. Calculated as $[\exp(b_j) - 1/m_j]$, where b_j is the regression coefficient of the education dummy variable j and m_j is the corresponding average years of schooling (see Appendix table A8.2). Average length of schooling is 3.9 years for those with primary schooling; 8.2 years for those with lower secondary schooling; 11.4 years for those with upper secondary schooling; and 14.8 for those with higher education.
Source: Authors' estimates based on 1999 *Enquête Prioritaire auprès des Ménages.* See Appendix table A8.2.

to education among wage earners based on the earnings functions reported in Appendix table A8.2. The returns on a year of schooling are estimated to be on the order of 6.9 percent a year. Compared with someone with no schooling, a wage earner with primary schooling reaps a return of more than 5 percent a year. The returns to lower secondary education are more or less of the same magnitude, between 8 and 9 percent. University education, which entails, on average, an investment of 15 years of study beginning with grade 1, is highly profitable, with an estimated rate of return of 13.1 percent a year. As in many low-income economies with tiny modern sectors (dominated, moreover, by the civil service), one explanation for the relatively high private returns to higher education is the "stickiness" of wages at the high end of the labor market. This stickiness reflects a tendency for imbalances in the supply of and demand for highly educated labor to be accommodated through quantity rather than price adjustments.

Output of Graduates and Their Absorption into the Work Force

With an employment share of 80 percent of the labor force, agriculture dominates Madagascar's economy and will continue to do so in the foreseeable future. Overall economic growth in the coming years will therefore depend on two simultaneous developments: (a) appreciable productivity gains in agriculture and in the nonformal sector, and (b) expansion of the typically more productive modern sector of the economy. How can investments in education best support these developments?

Worldwide experience shows beyond doubt that basic education provides the skills that are most effective in boosting productivity gains in agriculture and the nonformal sector, particularly where opportunities exist for technological innovation and change (see, for example, Easterlin 1981; Foster and Rosenzweig 1996; World Bank 2000b).[1] Beyond its immediate economic impact, basic education also promotes other socially desirable outcomes such as better health, greater participation in the country's social and cultural life, and stronger community development. In this sense basic education qualifies as an all-purpose investment that can help catalyze the economic transformation of the traditional sectors, as well as improve the general well-being of the population.

The development of the modern sector, which encompasses, broadly, industry, manufacturing, and services, is driven largely by the incentives created by the macroeconomic environment (for example, tax policies, interest rate policies, and trade liberalization) and the quality of the business climate. The availability of moderately to highly educated labor—in sufficient volume and equipped with the appropriate skills—is obviously essential to facilitate the sector's growth, not least because production processes in the modern sector are typically technology- and knowledge-intensive. But the fact remains that it is not the mere availability of qualified labor but the economy's capacity to absorb such labor and use it in appropriate jobs that ultimately determines the effective productivity of the graduates supplied by the education system. The implication is clear: although education policy cannot affect the demand for educated labor, which is driven by forces outside the sector, it can ensure that the numbers and skills mix of future entrants to the labor market are geared as much as possible to the demand for educated labor.

How well does Madagascar's education system perform in this regard? Does it produce too many or too few graduates in relation to the availability of jobs for qualified labor? Does it produce graduates with the competencies sought by employers? Because of data constraints we limit ourselves to the quantitative dimension of the problem. Thus, we will evaluate the match between the education system's output of graduates at the various levels against the graduates' absorption in the labor market. We supplement the results with a closer look at the incidence of overeducation and at job search duration, as well as with cross-country comparisons of the relation between higher education coverage and a country's level of economic development.

An obvious approach toward assessing the production of and demand for educated labor is to compare the number of graduates exiting from the education system each year at the various levels with recruitment by level of qualification. The output of graduates can be estimated from school statistics, but examination of the flow of new

recruitment requires data from dedicated surveys that trace school leavers' transition to the labor market. Because such data are currently unavailable for Madagascar, we rely instead on estimates based on changes in the stock of employment as captured in the household surveys for 1993, 1997, and 1999 and in the population census of 1993.[2]

Table 8.6 shows the distribution by educational attainment of the roughly 300,000 people estimated to make up the cohorts currently exiting the education system, matched against the annual flow of new recruitment by sector and type of employment. Because the underlying data are sparse, we emphasize that the estimates offer only a rough picture of the situation. Exits from the education system have been estimated by piecing together information on survival rates, transition rates, examination success rates, and first-year cohort sizes at various levels of education.

Consider, for example, the education system's output of graduates from upper secondary and higher education. In recent years about 14,000 students each year reached the last grade of the general upper secondary cycle, and about 10,000 of them obtained the *baccalauréat*.[3] More than 85 percent of *baccalauréat* holders continue on to higher education (including those enrolled in the distance system), but given that the universities produce only about 3,700 graduates annually, an estimated 6,300 students of the 10,000 do not go beyond the *baccalau-*

Table 8.6
Output of Graduates and Their Absorption in the Labor Market, Madagascar, circa 1999

Output of the education system				Annual number of new jobs		
Educational attainment		Number in each cohort (thousands)		Sector/type of employment	Number of jobs (thousands)	
None	No schooling	57	195	Agriculture	?	281.5
Primary schooling	Incomplete primary	138		Informal sector	?	
	Complete without CEPE	24	89	Small firms	?	
	Complete with CEPE	31				
Lower secondary	Incomplete lower secondary	17				
	Complete without BEPC	17				
	Complete with BEPC	2.5	5	**Large firms and civil service** Lower level jobs	18	26.5
Upper secondary	Incomplete upper secondary	2.5				
	Baccalauréat[a]	7.3	11	Higher level jobs	6.5–6.0 } 8.5	
Higher education	Higher education	3.7		Top-level jobs	2.0–2.5	
Cohort size		300			300	

Note: The CEPE, BEPC, and *baccalauréat* refer, respectively, to the qualification obtained after passing the national examinations at the end of the primary, lower secondary, and upper secondary cycles.

a. Includes general and technical *baccalauréat* as well as DEUG holders. The latter degree is obtained after a two-year course at the university level but is included here in lieu of information on the number produced each year at this level of qualification.

Source: Authors' estimates based on data on enrollments, repeaters, and first-year entrants at the various levels of education, as well as passes at the CEPE, BEPC, and *baccalauréat* examinations, and on data from the 1993 population census as reported in Madagascar (1997c), the 1993 *Enquête Permanente auprès des Ménages*, and the 1997 and 1999 *Enquête Prioritaire auprès des Ménages*; see text for explanation.

réat.[4] Adding to this number the estimated 1,000 students in technical upper secondary education who obtain the *baccalauréat* but do not continue on to obtain a higher education degree, 7,300 students exit the education system with the *baccalauréat* as the highest level of educational attainment. Applying a similar approach to the other levels of schooling, it is possible to estimate the education profile of the population in each cohort.

How do the results compare with the rate of job creation at the high end of the labor market? To answer this question we estimate changes in employment according to broad categories, the choice of categories being dictated by the degree of comparability across the different surveys. The groupings in the table do not correspond strictly to particular levels of educational attainment, but it seems reasonable to assume that professional jobs (classified as *cadres moyens* and *cadres supérieurs* in the household surveys) in large firms and the civil service would require at least a *baccalauréat*, while lower-level jobs in these organizations would require at least a BEPC. To illustrate our method, consider professional-level jobs. According to the 1993, 1997, and 1999 household surveys, the number of people in such jobs rose from 146,106 in 1993 to 171,902 in 1999, implying an increase of 4,300 jobs a year. Using data only on household heads and their spouses, the corresponding increase is smaller, 3,600 jobs a year. Taking both figures into consideration, we estimate that the stock of this type of jobs is rising at the rate of about 4,000 jobs a year. Allowing for an attrition rate of about 2.5 percent a year, the number of new positions at the professional level is estimated at 8,300 a year (= 4,000 + 0.025 × 171,902); we round it off to 8,500 to err on the generous side. Using a similar approach, we estimate that about 18,000 new lower-level jobs become available each year in large firms and the civil service.

Of the estimated 8,500 higher-level jobs in large firms and the civil service, how many will be top-level positions appropriate to university graduates' training? To make this estimation, we note that about 17 percent of *cadres* in the 1999 household survey have university degrees (at or above the *licence* level), compared with 16 percent in the 1993 sample. The trend thus implies that top-level positions are growing somewhat faster than upper-level jobs as a whole, just as one would expect in a modernizing economy with a very small initial stock of highly qualified workers. In a static situation the top-level jobs would number about 1,445 (= 0.17 × 8,500), but in a dynamic context such jobs would be created at a faster pace, raising the share of university degree holders in top jobs. If the share rose from the current 17 percent to 25–30 percent—a very optimistic assumption—between 2,125 and 2,550 new jobs would be created at this level. Given the rough nature of these estimates, we round the numbers off to between 2,000 and 2,500.

From these rough estimates, we can draw some broad conclusions regarding the match between the output of the education system and the absorptive capacity of the labor market. At the high end of the labor market, the number of new professional-level jobs is somewhat smaller than the education system's aggregate output of upper secondary and higher education graduates, implying that the system's coverage at these levels is not particularly undersized, given the current rhythm of economic activity in the modern sector.[5] Looking more narrowly at higher education alone, our estimates suggest that even under the most favorable assumptions, the current production of about 3,700 graduates annually probably exceeds the labor market's absorptive capacity at the top end. As for lower-level jobs in large firms and the civil service, there again do not appear to be major constraints in filling the 18,000 new positions with school leavers who have completed lower secondary education (with or without a BEPC certificate).

Where the table *does* suggest a major mismatch between the education system and the labor market is at the bottom of the education pyramid: the system currently produces only 89,000 graduates with at least a complete primary education but less than a complete lower secondary education. Most of these graduates will work in agriculture, in the informal sector, or in small businesses. On average, each of them can expect to labor alongside two contemporaries with either no schooling or incomplete primary schooling. (The number of the latter workers totals 195,000.) For policymakers contemplating the country's long-term economic growth strategy, the issue raised by the analysis thus far boils down to whether the persistence of such a poor skills mix

is consistent with efforts to modernize agriculture and the country's traditional economy. Furthermore, the fact that each higher education student in the public sector costs the government nearly 20 times as much as each child in public primary school implies that any oversupply of higher education graduates carries a very high opportunity cost, particularly when public budgets are tight.

"Overeducation," unemployment, and job search duration

Is the foregoing assessment of oversupply at the top of the education pyramid consistent with other labor market evidence, such as the incidence of over- and undereducation among workers with different levels of educational attainment and the patterns of unemployment and job search duration?

Table 8.7 presents data on the incidence of over- and undereducation based on a 1997 sample of about 3,000 wage earners in Antananarivo, where most modern sector employment is concentrated. Following common practice in the labor economics literature, (see, for example, Sicherman 1991; Verdugo and Verdugo 1989), we define three categories of wage earners:

- "Adequately educated" workers are those whose years of schooling fall within one standard deviation of the mean years of schooling of wage earners in the same occupation, defined at the two-digit level.

Table 8.7
Percentage Distribution of Wage Earners by Educational Attainment Relative to Mean for Workers in the Same Occupation, Antananarivo, 1996
(percent)

Relative educational attainment	No schooling	Primary	Secondary		Higher	All wage earners
			General	Technical		
Whole sample						
Adequately educated	0	67	76	76	61	69
Overeducated	0	0	17	23	37	15
Undereducated	100	32	6	1	2	16
Total	100	100	100	100	100	100
Wage earners below age 30						
Adequately educated	0	73	72	62	36	67
Overeducated	0	1	24	38	64	17
Undereducated	100	27	4	0	0	15
Total	100	100	100	100	100	100
Wage earners 30 years or older						
Adequately educated	0	61	79	85	66	71
Overeducated	0	0	12	13	32	13
Undereducated	100	39	9	2	2	16
Total	100	100	100	100	100	100

Note: A wage earner is classified as adequately educated if his or her years of schooling fall within one standard deviation of the sample mean years of schooling for workers in the same occupation (specified at the two-digit level); as "overeducated" if years of schooling are at least one standard deviation above the mean; and as undereducated if years of schooling are at least one standard deviation below the mean.
Source: Authors' calculations based on data in 1996 *Enquête Emploi*.

- "Overeducated" workers are positioned above the mean by more than one standard deviation.

- "Undereducated" workers are below the mean by more than one standard deviation.

The pattern across wage earners by level of educational attainment shows the telltale signs of the labor market's limited capacity to absorb graduates from the top end of the education pyramid: the share of overeducated wage earners with university degrees is nearly 37 percent, on average, compared with 17 percent among those with general secondary schooling, and the share rises to nearly 64 percent among university degree holders below 30 years of age. While we would expect some overeducation in most occupations as younger and typically better-educated workers enter the labor force, the extent of the problem appears excessive among university degree holders (and, to a lesser extent, among technical secondary school graduates). The result is probably more a symptom of constraints in labor market absorption than of the normal dynamics of skills upgrading in the work force. It is to be emphasized that this assessment of overproduction pertains to the *aggregate* volume of output from higher education and does not rule out the possibility of shortfalls in certain fields of study.

University graduates who fail to enter occupations for which their training prepares them eventually lower their expectations and accept less desirable, lower-level jobs. The mismatch between their training and job placement implies that some of the potential productivity from a university degree remains unrealized. In addition, it generates negative spillover in the sense that the same problem percolates down to less well educated school leavers. This ripple effect arises because in a labor market with too many graduates chasing after too few jobs, employers have their pick of job applicants and tend to hire better-educated candidates even though they are overqualified for the job. The market accommodates the excess supply of applicants mostly through quantity rather than price adjustments, a typical dynamic in the tiny formal sectors characteristic of most low-income countries. In the nonformal sector, where there is greater price flexibility, the influx of job seekers who have been unsuccessful in obtaining formal sector employment tends to depress wages, thereby lowering the returns to education, especially for the less well educated.[6]

This picture of labor market dynamics is consistent with the patterns of unemployment and waiting time for stable employment for workers with different educational attainments (Table 8.8). On average, the rate of unemployment declined between 1993 and 1999 for those with secondary and higher education but rose among those with no schooling or only primary schooling. When we focus on recent entrants to the labor market (most of whom are in the age groups indicated by the shaded cells in Table 8.8), the more favorable trends among the better educated come into even sharper relief: the unemployment rate for higher education graduates declined from 32 percent in 1993 to 19 percent in 1999 and that for secondary school leavers, from 27 to 18 percent. In contrast, it rose slightly for the other two education categories.

Data from a 1997 survey of residents of Antananarivo, reported in Table 8.8, show that higher education graduates take the least time to obtain their first stable employment—on average, about 14 months, which is a long time but much less than the 26 months among secondary school leavers and almost 35 months among primary school leavers. Not shown in the table but also tracked in the survey was the labor market transition of technical secondary school leavers. On average, they take about 15 months to obtain their first stable job. The only people who find stable employment almost immediately are those without schooling, but nearly everyone in this group is self-employed or works as an apprentice, unskilled laborer, or unpaid family worker, and the rapid entry into these positions is probably motivated more by survival pressures than by choice.

Cross-country perspectives

As a complement to the preceding analyses, we take advantage of cross-country data to compare the production of educated labor in Madagascar with the economy's likely absorptive capacity for such labor. In principle, this type of analysis applies to all terminal levels of schooling that supply workers to the modern sector of the economy. These are mainly

Table 8.8
Unemployment and Job Search Duration by Level of Education, Madagascar, 1993 and 1999

	1993					1999				
Indicator	No schooling	Primary	Secondary	Higher	All	No schooling	Primary	Secondary	Higher	All
Unemployment rate										
14 or younger	15.7	20.0			17.9	18.1	24.2			20.4
15–19	9.5	15.9			16.1	16.5	16.6			17.5
20–24	4.8	8.0	26.8		11.1	12.1	9.6	17.5		12.4
25–29	2.4	3.6	13.1	31.8	6.2	6.9	5.1	11.2	18.9	7.7
30–34	1.4	2.1	7.7	18.2	3.5	5.1	1.6	4.1	13.6	3.6
>34	0.6	1.0	3.1	5.7	1.2	1.9	1.2	1.6	1.9	1.5
All age groups	4.4	6.6	14.7	14.6	7.1	8.6	7.1	8.4	6.5	7.8
Months of waiting for first stable job[a]	—	—	—	—	—	1.9	34.7	26.3	13.7	26.8

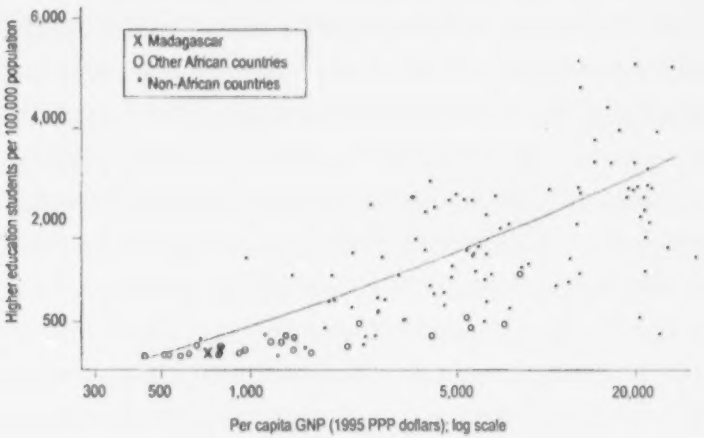
— Not available.
Note: The shaded cells refer to age groups in which most of the first-time entrants from each education category are likely to be concentrated; cells are left empty where the number of observations is too small to calculate reliable rates of unemployment. The average unemployment rate is weighted by the age distribution of the observations. Unemployment rates refer to data for 1999; waiting times refer to data for 1997.
a. The data pertain only to Antananarivo. A stable job is one that employs the worker for at least six months. According to the 1997 *Enquête Santé-Education-Transfert* survey, graduates of technical secondary education take about 14.7 months to find their first stable job.
Source: For 1993 and 1999 unemployment rates, 1993 *Recensement Général de la Population et de l'Habitat* and 1999 *Enquête Prioritaire auprès des Ménage*, respectively; for duration of job search, 1997 *Enquête Santé-Education-Transfert* (SET), as reported in Ramilison (2000).

vocational/technical education and higher education, but since the available cross-country data pertain only to higher education, the analysis here is limited to that subsector. For our purposes, we use the number of students in higher education per 100,000 population as a proxy for the education system's output of educated labor. This measure is more appropriate than the gross enrollment ratio (defined as the number of students in higher education in relation to the relevant population, typically those in the 18–22 age group) because students at this level often span a broad age range.

Across countries, the general tendency is that as incomes rise, people increasingly work outside agriculture, and demand for educated labor expands. These trends combine to fuel the expansion of higher education even as rising incomes make the expansion increasingly affordable. Figure 8.2 shows the relation between coverage in higher education and per capita GNP. Madagascar is positioned in the figure more or less where one would expect to find a country at its income level. When we confine the comparison to Sub-Saharan African countries, Madagascar, with 194 students in higher education per 100,000 population, is far above the figure of 137 per 100,000 predicted for an African country at its current income level.[7] Another way to look at the comparison is to simulate the level of income that would be consistent with Madagascar's current coverage in higher education. Again considering only data for African countries, the simulation shows that countries with 194 students in higher education per 100,000 population would have an average per capita income of $1,196 (in purchasing power parity terms)—more than 60 percent higher than Madagascar's present income level. Even if Madagascar's per capita income grew at the highly optimistic rate of 5 percent a year, it would take the country about 10 years to reach the $1,196 income level.

Taken together, the data presented above suggest that Madagascar's current rate of output of higher education graduates continues to exceed the labor market's absorptive capacity. It should be recognized that the situation is under much better control

Figure 8.2
Relation between Per Capita GNP and Coverage in Higher Education, Selected Countries, circa 1995



Note: GNP, gross national product; PPP, purchasing power parity.
Source: TFHES (2000); World Bank SIMA database.

today thanks to the dramatic policies initiated by the government in the 1990s. These measures have kept total enrollments stabilized at around 30,000 since 1995 (194 students per 100,000 population), compared with the peak level of around 43,000 in 1992 (383 students per 100,000 population). The problem of excess production affects general as well as technical secondary education, albeit to a smaller degree. Overproduction of secondary and higher education graduates has led to a situation in which the better educated find employment faster than others with fewer years of schooling, but they obtain jobs that would normally be filled by less-qualified workers. The mismatch between workers' qualifications and their job placement implies that part of the potential productivity gains from investments in secondary and higher education in fact fails to materialize, given current conditions in the Malagasy labor market.

Several policy implications stem from these results. The first is the need for continued efforts to raise survival rates in primary schooling. As these efforts succeed, pressures to expand postprimary schooling will inevitably mount, making it increasingly important to manage these pressures so as to ensure that the expansion of enrollments at all levels, but especially in higher education, is calibrated to the labor market's capacity to absorb graduates into appropriate employment. Policymakers could consider administrative measures to manage the expansion, including more systematic and tighter selection criteria for secondary and higher education, especially in the highly subsidized public sector. But equally relevant are market-sensitive measures that encourage greater cost-consciousness on the part of individuals and their families as they make educational choices at the secondary and higher education levels. These measures include continued and expanded reliance on self-financing service providers in the private sector and greater cost sharing by students in public higher education (with appropriate features to minimize any adverse impact on those from poor families). By focusing attention on the investment aspect of these choices, mechanisms such as these can help tighten the link between education and the labor market.

Beyond the quantitative balance between the supply of and demand for educated labor, the issue of skills match is equally important. Unfortunately, the available data do not permit a more detailed discussion here, but we note in passing that the government has already begun moving in what

seems to be the right direction, particularly in higher education. Among the measures being undertaken are reform of course curricula to equip students with marketable skills.

Skills Development in the Work Force

So far, we have focused on the flow of educated labor into the work force. In this section we take up the question of the stock of workers in both the formal and informal sectors, documenting such aspects as the educational composition of the work force, the extent and nature of workers' exposure to skills upgrading, and the supply and cost of in-service training for skills development.

Deteriorating skills of the work force

The share of the labor force with no schooling declined considerably between 1993 and 1999, from 37 to 28 percent, while the share of those with at least some secondary education rose significantly, from 14 to 23 percent. The implied improvement in the education of the labor force is largely an illusion, however (see Table 8.9). Although more and more people attended school, the investment in schooling in fact became steadily weaker as the primary education system deteriorated, resulting in a growing skills deficit among younger workers. According to the 1999 *Enquête Prioritaire auprès des Ménages*, workers age 15–19 average only 2.9 years of schooling, and those age 20–24 average 4.2 years. In contrast, those in the age groups 30–24 and 35–39 average more than 5 years. As expected, formal sector workers have more years of schooling than those in the informal sector, averaging 8 years of schooling versus 3, but even within the modern sector the educational profile of the labor force shows signs of decline, with workers age 35–44 averaging more than 9 years of schooling, compared with 6–8 years among those age 20–29.

Many Malagasy firms feel constrained in their operations by the skills deficit and perhaps even more by the mismatch between workers' initial education and the firms' business needs. According to the 1998 CITE/PRESUP/CNFTP/ARIF survey, 35 percent of the sample firms believe that their businesses are hindered by their employees' inadequate skills and lack of technical competence (Table 8.10). More than 30 percent of the technicians and production workers in the sample firms are felt to be in need of skills upgrading. Among workers in other positions (administration, management, finance, and marketing), the need is believed to be most widespread among the managers.[8] Whereas formal sector firms identify skills gaps as among the most critical constraints on their businesses

Table 8.9
Educational Attainment of the Work Force, Madagascar, 1993 and 1999

Indicator	1993	1999		
		Formal sector	Informal sector	Total
Distribution by educational attainment (percent)[a]				
No schooling	36.8	7.7	31.1	27.7
Primary	47.2	27.9	51.0	47.6
General secondary	14.0	54.0	17.4	22.7
Higher education	1.2	10.4	0.5	1.9
Total	100.0	100.0	100.0	100.0
Average years of schooling by age group				
10–14	—	0.7	0.9	0.9
15–19	—	4.5	2.8	2.9
20–24	—	6.4	3.9	4.2
25–29	—	8.2	4.3	4.8
30–34	—	8.9	4.9	5.6
35–39	—	9.2	4.2	5.2
40–44	—	9.5	3.4	4.9
45–49	—	8.6	3.2	4.3
50–54	—	8.0	2.5	3.5
55–59	—	6.9	1.9	2.7
60 and older	—	3.5	2.0	2.1
Total	—	7.9	3.3	3.9

— Not available.
a. The number of years required to attain the indicated level of education is ignored.
Source: 1993 *Recensement Général de la Population et de l'Habitat*; authors' estimates based on 1999 *Enquête Prioritaire auprès des Ménages*.

Table 8.10
Main Business Constraints Encountered by Malagasy Firms, 1998

Formal sector		Informal sector (Antananarivo only)	
Constraint	Percentage of firms	Constraint	Percentage of firms
Lack of financing	54	Lack of clientele	51
Lack of new equipment	52	Problems with getting credit	38
Poor condition of equipment	37	Too much competition	23
Poorly trained staff	35	Obtaining primary inputs	21
Difficulties with government regulations	29	Lack of machines or equipment	20
Difficulties with supply	26	Lack of space	19
Lack of information	17	Credit costs	10
Staff recruitment	16	Management difficulties	8
		Too much regulation/tax	6
		Manufacturing difficulties	4
		Recruitment of qualified personnel	2

Note: Multiple responses were permitted.
Source: For the formal sector, Basquin (1999); for the informal sector, MADIO (1998).

after the need for financing and new equipment, firms in the informal sector (according to *Enquête 1-2-3*, fielded in Antananarivo in 1998) see problems with start-up, financing, and access to credit as far more critical. Barely 2 percent of the informal sector firms perceive their workers' level of training as a real obstacle.

The prevalence and impact of in-service training

In-service training is one way to overcome problems with workers' skills, and formal sector firms in Madagascar apparently make use of it to a large extent. According to the 1996 *Enquête Industrielle*, 53 percent of the sample firms provide in-service training to their staff. This practice is naturally more widespread among large firms (80 percent) and those in the tax-free zones (90 percent) than among microenterprises (29 percent; see Table 8.11). In-service training is thus far from negligible in Madagascar and is even more prevalent than in some countries at a much higher level of economic development.

Data from the 1999 *Enquête Prioritaire auprès des Ménages* suggest that about 11 percent of the wage earners in the formal sector and less than 3 percent of those in the nonformal sector received in-service training. As Table 8.12 shows, investment in training declines with age; returns to additional training among older workers are generally low, and older employees and their employers are therefore less inclined to invest in in-service training. Besides age, the likelihood that an employee receives such training is also highly dependent on his or her initial level of education. In the formal sector those with a university degree are 6 times as likely to receive in-service training as those with only primary schooling and 1.4 times as likely as those with secondary education.

One analysis of the 1996 *Enquête Industrielle* suggests that in-service training does not seem to improve firm productivity (Lane and Péresson 2000). As the authors acknowledge, however, this result seems inconsistent with the fact that most formal sector firms do train their workers. The finding also contradicts other evaluations of in-service training in developing countries (Tan and Batra 1995). It there-

Table 8.11
In-Service Training by Formal Sector Firms, Madagascar and Selected Countries, 1990s

Country	Percentage of firms providing in-service training	Number of firms in survey
Madagascar (1996)		
Sector		
Agroindustry	50.0	48
Mining and extractive industries	50.0	26
Food	47.4	137
Textiles and leather	52.6	173
Wood, paper, and printing	54.3	151
Chemicals	69.2	52
Other industries	51.01	137
Construction and public works	53.8	78
Energy	100.0	2
Service firms in the tax-free zones	90.0	10
Number of employees		
< 5	28.5	245
5–50	56.7	328
51–100	71.7	92
100–500	73.6	110
> 500	79.4	39
Total	53.3	814
Other countries		
Colombia (1992)	52.4	—
Indonesia (1992)	23.9	—
Malaysia (1994)	45.6	—
Mexico (1994)	45.6	—

— Not available.
Note: Data include in-service training organized directly by firms or contracted for by external providers.
Source: For Madagascar, authors' estimates based on the 1996 *Enquête Industrielle*; for other countries, Tan and Batra (1995).

Table 8.12
Predicted Probability of Participating in In-Service Training, by Educational Level and Age, Madagascar, 1999

	Formal sector	Informal sector
By level of education[a]		
No schooling	2.1	1.3
Primary	2.6	1.6
Secondary	12.9	8.4
Higher education	16.7	10.9
Average probability (for the sample)	10.6	3.0
By age[b]		
30	10.6	6.8
40	14.2	9.2
50	15.0	9.8
55	14.3	9.3
60	12.8	8.2
Average probability (for the sample)	10.6	3.0

Note: The simulations are based on the logistic regression estimates reported in Appendix table A8.3.
a. Refers to the predicted probability for a wage earner age 35 years.
b. Refers to the predicted probability for a wage earner with secondary education.
Source: Authors' estimates based on 1999 *Enquête Prioritaire auprès des Ménages*.

fore needs careful interpretation, not least because the underlying data may not accurately capture the extent of firms' investment in in-service training and because of the difficulty of establishing a proper link between the timing of a firm's decision to invest in training and the timing of subsequent gains in firm productivity. In contrast to the firm-level results, studies in other countries (Tan and Batra 1995) consistently suggest that formal sector employees do benefit from in-service training. Analysis of the 1999 *Enquête Prioritaire auprès des Ménages* suggests that all else being equal, trainees' incomes rise by about 11 percent as a result of such training.[9]

The organization of in-service training

Very little is known about the supply of in-service training, as there is currently no inventory of training organizations that would permit a full assessment of the range of services available. The descrip-

tion below therefore offers only a partial picture, based on data from the METFP's 1997 *Répertoire des Etablissements et des Centres de Formation Technique et Professionnelle* and the administrative records that the CNFTP maintains on the training programs it financed in the past.

As with preservice education and training, the private sector plays a key role in supplying in-service training, accounting for 81 percent of the 224 centers surveyed by the METFP that offer professional training (Table 8.13). Here again, the private institutions are relatively new, most having entered the field after the mid-1980s. Except for the institutions run by religious organizations and NGOs, private training centers offer few services for the uneducated; barely more than 50 percent of them run programs at the CEPE level. Most of the centers specialize in service sector training programs, which generally require less capital investment to set up than other programs and for which demand is strong, given current labor market conditions.

The costs of in-service training are apparently very high, averaging 180,000 FMG an hour in 1997 according to CNFTP administrative data (Table 8.14). Courses for skills upgrading, which are, effectively, continuing education programs, are more expensive than other types of training, such as those for start-up entrepreneurs and to a lesser extent, those offering induction orientation for new employees. Taken together, the results suggest that while many firms feel a need to invest in in-service training to upgrade their workers' skills, the costs of the investment are high, and the returns are largely unproven.

The average training costs presented in Table 8.14 hide wide variation. Costs are particularly high in the private sector: for skills upgrading (the most common type of course) the charge in the private

Table 8.13
Supply of In-Service Training, Madagascar, 1996

		Private sector					
	Public sector	Religious	Secular	NGOs	Semiprivate	Total	Total
Number of establishments	25	61	120	12	6	199	224
By entry requirement							
CEPE or less	15	52	36	12	2	102	117
BEPC	5	7	69	0	1	77	82
Baccalauréat	5	2	15	0	3	20	25
By economic sector of training offered							
Agriculture	3	17	2	2	0	21	24
Industry	13	20	40	3	2	65	78
Services	9	24	78	7	4	113	122
Average duration of training (months)							
Agriculture	3.3	3.6	11.0	4.8		4.0	4.0
Industry	4.9	5.2	7.2	4.7	5.5	6.4	5.9
Services	4.1	3.8	5.1	2.9	3.4	4.8	4.5
All courses	4.4	4.2	5.9	3.7	4.1	5.2	5.0
Year established (average)	1974	1976	1988	1973	1989	1984	1982

Source: Authors' estimates based on METFP, 1997 *Répertoire des Etablissements et des Centres de Formation Technique et Professionnelle.*

Table 8.14
Hourly Cost of Training by Type, Madagascar, 1997
(thousands of 1997 FMG)

Type of training	Average	Standard deviation
Induction training for new employees	139	241
Training for skills upgrading	199	410
Training for start-up entrepreneurs	49	57
Total	182	386

Source: Authors' estimates based on CNFTP, 1997 *Enquête Administrative.*

sector is about FMG 220,000 an hour, compared with FMG 180,000 an hour in the public sector (Table 8.15). In both sectors the most striking feature is the exorbitant cost of instructor time. On average, private sector instructors earn about FMG 103,000 an hour, while their public sector counterparts are paid about FMG 86,000 an hour. These rates are, respectively, 6.4 and 5.3 times the rate at which university teachers are remunerated for overtime teaching.

Table 8.15
Hourly Cost of Training for Skills Upgrading by Economic Sector of Training Offered, Madagascar, 1997
(thousands of 1997 FMG)

	Public sector		Private sector	
Sector	Total cost	Cost of trainers[a]	Total cost	Cost of trainers[a]
Agriculture	129	63	99	52
Industry	205	96	129	66
Services	166	77	255	117
Total	183	86	219	103
As a multiple of the hourly rate for overtime teaching by university teachers		5.3		6.4

a. Excludes the costs of staff responsible for designing course content.
Source: Authors' estimates based on CNFTP, 1997 *Enquête Administrative.*

Conclusion

This chapter has considered two main issues in the link between education and the labor market. The first has to do with the extent to which the education system's output, measured both quantitatively and qualitatively, is meeting the demand for educated labor in a predominantly rural economy in the process of modernization. The second issue relates to the stock of the labor force in the formal and informal sectors of the economy, focusing on the nature and impact of investments in skills development and the constraints on such investments.

We have argued that two parallel developments will be crucial for transforming the Malagasy economy: appreciable productivity gains in agriculture and in the traditional economy, and expansion of the country's tiny modern sector. Policies in education can contribute significantly to both developments: to the former, by ensuring that the bulk of the population receives at least a complete primary schooling, and to the latter, by supplying moderately to highly educated labor in sufficient quantity and quality to meet the demands of the modern sector.

Our analysis suggests that a serious imbalance exists at the bottom of the education system, in the sense that each year large numbers of new workers enter the work force in agriculture and the informal sector without the modicum of schooling needed to achieve permanent literacy and numeracy. Persistence of the current skills mix of two new workers without complete primary schooling for every worker above this threshold is arguably inconsistent with efforts to modernize the traditional economy. As for the high end of the education system, our analysis suggests that *in the aggregate* the production of postprimary graduates appears to be largely consistent with the capacity to absorb educated labor in the modern sector. Yet within this broad overall balance, the system is probably overproducing university graduates, most of whom expect to hold jobs at the top end of the labor market but instead find themselves in jobs for which they are overqualified. In qualitative terms, there is also scope for improving the match between the skills of university graduates and those sought by modern sector employers. Many employers rank poor technical competence of their work force,

including those at executive levels, as one of the top three problems that currently constrain their businesses. Thus, it is not surprising that formal sector firms in Madagascar invest substantially more than their counterparts in other developing countries in upgrading the skills of their workers, despite the exorbitant costs of in-service training.

Several implications for policy development follow from these results. Ensuring that all children benefit from a full primary education is a clear priority—one that is already emphasized in the government's poverty reduction strategy. As completion rates at this level rise, it is important to anticipate the pressures for expansion at subsequent levels and to develop measures to manage them so that the output of graduates is attuned as much as possible to the labor market's capacity to absorb them into productive employment. Administrative measures, such as more systematic and tighter criteria for entry to secondary and higher education and to particular fields of study within higher education, and other supply-side interventions, such as reforming the curriculum and opening new fields and courses of study, are ways of managing the pressures for expansion. Policymakers could also promote greater reliance on market signals to guide individuals' choice of studies, through better dissemination of employment information and through cost-sharing arrangements in education finance that encourage prospective students, particularly those in higher education, to view their studies more as an investment than as an entitlement. In this regard private schools play a critical role: they can help satisfy the demand for secondary and higher education and at the same time introduce the cost-consciousness among consumers needed to tighten the link between education and the labor market.

Notes

1. The extensive literature on the relation between education and productivity suggests that (a) farmers with at least four years of primary education produce more for given levels of inputs and are more inclined to adopt new agricultural techniques and engage in off-farm activities with high returns, and (b) workers in the nonformal sector who are equipped with a basic education can similarly take advantage of their skills to gain a better livelihood (see, for example, Lockheed, Jamison, and Lau 1980).

2. The surveys are the 1993 *Enquête Permanente auprès des Ménages* and the 1997 and 1999 *Enquête Prioritaire auprès des Ménages*.

3. Each year 30,000 candidates sit for the *baccalauréat* examination; 9,900 of them pass and obtain the *baccalauréat*, giving a pass rate of 33 percent. Many of those who fail retake the examination, so that among those who reach the last grade in the secondary cycle, an estimated 70 percent eventually obtain the *baccalauréat*.

4. The total of 3,700 excludes an unknown number of university students who exit with the two-year DEUG degree. These are thus among the 6,300 with the *baccalauréat* degree.

5. This assessment is consistent with the fact that in the government's recent recruitment exercises for primary and secondary school teachers, about five qualified applicants applied for each available position.

6. Other factors that depress the returns to education are undoubtedly also at work, including the fact that most production processes in the Malagasy economy, particularly in agriculture and the nonformal sector, are not particularly capital-intensive.

7. Given the high levels of graduate unemployment in many African countries, one may reasonably argue that the predicted figure may even be too high in relation to the absorptive capacity of the labor markets in these economies.

8. Authors' estimates based on the CITE/PRESUP/CNFTP/ARIF survey.

9. Authors' estimate based on the earnings function presented in Appendix table A8.4.

Technical Note on Regression Models on Student Achievement

The note explains our procedure for separating out the relative importance of the following sources of private schools' advantage in student achievement over public schools: (a) greater selectivity, (b) better resource endowment, and (b) superior managerial efficiency.

Specifying the Basic Achievement Model

The first step involves specification of a model of student achievement. We follow the literature and specify student i's achievement (A_i) as follows:

$$A_i = \beta X_i + \alpha S_i + \varepsilon_i$$

where X is a vector of achievement-determining variables (including a subvector Z of family characteristics), S is the type of school attended, and ε is an error term.

Correcting for Selection Bias

If students in a particular school type differ systematically in some characteristics that are not explicitly represented by the variables in X, then the least-squares estimation of the above equation will be biased. One reason for this possible bias is that students who attend a particular type of school (or their families) may share, for example, a preference for the values that receive specific emphasis in those schools. Following common practice in the literature, we take account of this possibility by first estimating a school choice model and then using the results to compute a selection term that is in turn included in the achievement regression to correct for the selection bias (see, for example, Maddala 1983; Greene 1997; Vella 1998), using the Heckman (1979) two-step procedure.

We estimate in the first step a schooling choice model by the probit maximum likelihood method and generate the following selection terms for each alternative:

$$\lambda_1 = \frac{\phi(Z\gamma)}{\Phi(Z\gamma)} \quad \text{if } S = 1$$

$$\lambda_0 = \frac{\phi(Z\gamma)}{1 - \Phi(Z\gamma)} \quad \text{if } S = 0$$

where ϕ is the standard normal density function, Φ is the cumulative distribution function, and γ is the parameter vector associated with the school choice–determining variables.

In the second step we estimate the following regression:

$$A_i = \beta X_i + \alpha S_i - \sigma[\lambda_1 S_i - \lambda_0(1 - S_i)] + u_i.$$

The results for this regression specification appear in the columns entitled "Controlling for selectivity" in Table 5.22 and Appendix table A5.13, which relate students' test scores to the regressors.

Evaluating the Impact of Selection Bias

The results from the regression specifications allow us to compare differences in performance across school type by asking the following question: hold-

ing constant the achievement-determining variables (the vector X), how differently would a student currently attending a public school perform if enrolled instead in private school? Ignoring for the moment the effects of selection bias, the advantage of attending a private school is simply computed as follows:

$$E(A_i \mid S = 1) - E(A_i \mid S = 0) = \hat{\beta}.$$

The result measures the unconditional advantage of attending a private school—unconditional because it takes into account only the impact of the observed characteristics on performance and ignores the impact of selection bias associated with the school choice process.

We can also compute the conditional achievement advantage by incorporating the effects of selection bias into the calculation. Specifically, the predicted achievement of a pupil in a public or a private school, after taking into account possible selection bias, is given by, for public school:

$$E(A_i \mid S = 1) = \hat{\beta}X_i + \hat{\alpha}S_i - \hat{\sigma}\hat{\lambda}_1$$

and for private school:

$$E(A_i \mid S = 0) = \hat{\beta}X_i + \hat{\sigma}\hat{\lambda}_0.$$

The conditional effect of the private sector advantage is given by the difference between these two equations:

$$E(A_i \mid S = 1) - E(A_i \mid S = 0) = \hat{\alpha} + \hat{\sigma}(\hat{\lambda}_0 - \hat{\lambda}_1).$$

Evaluating the Impact of Differences in Resource Endowment and Managerial Efficiency

By choosing appropriate variables in the regression specification, we can estimate the impact of resource endowment and managerial efficiency on schools' performance. Specifically, when X, the vector of factors postulated to influence test scores, includes only a student's test scores from a previous grade and his or her personal and family characteristics, the performance advantage of a private school represents the totality of school effects on student performance arising from the combined influence of (a) differences in the tangible schooling environment as reflected, for example, in class size, staff qualification, availability of textbooks, condition of school facilities, the school head's management style, and so on, and (b) differences in the effectiveness with which the available inputs are managed to promote student learning.[1]

Alternatively, when the X vector is expanded to include the variables representing the tangible schooling environment, the performance advantage would then capture the impact on student achievement of differences in intangible factors at both the classroom and school levels, beyond the impact attributable to personal and family attributes and the tangible aspects of the schooling environment. The intangible factors include managerial effectiveness and other unmeasured inputs. Managerial effectiveness here corresponds to what Leibenstein (1966) terms X-efficiency factors, which refer to such influences on student achievement as incentives, motivation, and other organizational and cultural dimensions of the schooling context.

Note

1. The specification of X described in this paragraph follows common practice in the literature (see, for example, Hanushek 1986; Lau 1979). As indicated above, the achievement regression in our analysis involves year-end test scores as the dependent variable and incoming test scores as one argument in the vector X. A potential problem with this specification is that the coefficient estimate on the incoming test score may be biased because of its likely correlation with socioeconomic background. A possible solution is to transform the regression equation by using the difference between the scores in the two grades as the regressor rather than placing them on different sides of the equation. The procedure is inappropriate, however, for two reasons: the scores are based on different tests, making it impossible to recalibrate them to allow the performance of meaningful arithmetical operations between them, and the implied assumption of a one-to-one relation between scores on the two tests is unlikely to be valid.

Appendix Tables

Table A1.1
Government Revenue and Expenditure, Madagascar, 1990–99
(billions of current FMG)

		Government revenue				Government expenditure				
			Grants				Interest on debt			
Year	GDP	Current revenue[a]	Current	Capital	Total[b]	Current expenditure	External	Domestic	Capital expenditure[c]	Total
1990	4,603.9	544.4	66.8	135.4	752.8	418.9	47.5	22.0	365.2	784.1
1991	4,913.6	417.8	38.2	65.6	533.2	480.2	55.7	43.7	325.4	805.6
1992	5,593.1	546.6	61.7	133.7	752.6	658.6	77.2	114.5	462.3	1,120.9
1993	6,450.9	628.6	58.6	166.8	864.5	782.4	203.4	54.9	546.1	1,328.4
1994	9,131.2	757.1	39.0	235.0	1,035.9	1,168.1	462.2	29.7	635.5	1,803.6
1995	13,478.7	1,148.9	30.6	361.5	1,541.8	1,523.4	624.3	63.6	850.4	2,373.8
1996	16,224.4	1,404.7	116.1	567.3	2,090.7	1,703.8	628.6	130.6	1,179.6	2,883.4
1997	18,050.8	1,746.6	378.0	578.8	2,703.4	1,960.2	503.5	45.4	1,176.9	3,137.1
1998	20,343.0	2,165.2	59.0	640.1	2,864.3	2,146.1	466.5	87.3	1,673.1	3,819.2
1999	23,379.0	2,660.0	171.9	690.1	3,522.0	2,099.9	325.0	167.8	1,524.8	3,624.7

a. Excluding grants.
b. Includes capital revenues, which are relatively small, ranging from a high of 11.6 billion FMG in 1991 to a low of zero during 1997–99.
c. Includes net lending and unclassified expenditures.
Source: World Bank Africa Live Database, July 2000 version; SIMA database.

Table A1.2
Public Spending on Education, Madagascar, 1990–2000 (billions of current FMG)

Year	Total[a]	Current spending	Capital spending
1990	138.1	118.6	19.6
1991	155.4	132.0	23.5
1992	156.3	132.9	23.4
1993	168.5	152.0	16.6
1994	195.4	178.8	16.6
1995	236.3	227.4	8.9
1996	319.5	274.6	44.9
1997	422.8	344.2	78.6
1998	521.6	426.5	95.2
1999	646.5	498.1	148.4
2000	764.0	543.2	220.8

a. Includes current and capital spending by the MINESEB, the METFP, and the MINESUP, as well as the salaries of former *volontaires du service national* (VNSs) paid by local governments, the salaries of physical education teachers paid by the Ministère de la Jeunesse et du Sport (MJS); and central government transfers to communes for schools. For further details and breakdowns of intrasectoral spending, see the tables in Chapter 3.
Source: Computed from data on public spending on education reported in Madagascar (various years, a) for 1990–92: Madagascar (various years, b) for 1993–96, and Madagascar (various years, c) for 1997–2000.

Table A3.1
Public Spending by Level of Education, Madagascar, 1990–2000 (billions of current FMG)

Year	GDP deflator (1998 = 1.00)	Primary and secondary education			Higher education			All levels		
		Current	Capital	Total	Current	Capital	Total	Current	Capital	Total
1990	4.17	85.2	9.0	94.2	33.4	10.6	44.0	118.6	19.6	138.1
1991	3.56	99.0	12.0	111.0	32.9	11.5	44.5	132.0	23.5	155.4
1992	3.20	103.7	15.6	119.2	29.3	7.8	37.1	132.9	23.4	156.3
1993	2.82	116.4	12.6	129.0	35.6	4.0	39.6	152.0	16.6	168.5
1994	2.00	142.4	11.6	154.0	36.5	5.0	41.4	178.8	16.6	195.4
1995	1.37	187.8	7.1	194.9	39.6	1.8	41.4	227.4	8.9	236.3
1996	1.17	230.1	42.3	272.4	44.5	2.6	47.0	274.6	44.9	319.5
1997	1.09	294.1	65.9	360.0	50.1	12.7	62.8	344.2	78.6	422.8
1998	1.00	361.6	83.1	444.6	64.9	12.1	77.0	426.5	95.2	521.6
1999	0.95	424.8	115.4	540.2	73.3	33.0	106.3	498.1	148.4	646.5
2000	0.91	452.9	210.3	663.2	90.3	10.5	100.8	543.2	220.8	764.0

Source: Madagascar (various years, a) for 1990–92; Madagascar (various years, b) for 1993–96; Madagascar (various years, c) for 1997–2000; World Bank SIMA database for the GDP deflator used to convert spending from current FMG to 1998 FMG.

Table A3.2
Personnel in Public Primary and Secondary Schools, Madagascar, 1990–2000

School year	Primary		Lower secondary		Upper secondary	
	Number	Index (1990–91 = 100)	Number	Index (1990–91 = 100)	Number	Index (1990–91 = 100)
1990–91	36,105	100	9,116	100	2,497	100
1991–92	35,998	100	10,016	110	4,069	163
1992–93	33,748	93	10,210	112	3,997	160
1993–94	33,258	92	10,487	115	4,014	161
1994–95	33,880	94	11,652	128	3,734	150
1995–96	33,513	93	10,242	112	4,190	168
1996–97	31,607	88	10,771	118	3,937	158
1997–98	30,753	85	10,687	117	3,901	156
1998–99	31,795	88	10,577	116	4,426	177
1999–2000	34,385	95	11,115	122	4,067	163

Note: Includes teachers paid by FRAM, the school-based parent association; includes teachers assigned to teaching duties, as well as teachers assigned to other duties at the school level.
Source: Based on electronic data files supplied by the MINESEB.

Table A3.3
Numbers of Government Employees by Education Sector Budget Vote, Madagascar, 1991–2000

	Primary and secondary education[a]					Total education		Total civil service	
Year	MINESEB	Former VSNs	Total	METFP[b]	MINESUP[c]	Excluding former VSNs	Including former VSNs	Excluding former VSNs	Including former VSNs
1991	46,487	13,907	60,394	..	1,501	47,988	61,895	120,878	134,785
1992	46,433	13,907	60,340	..	1,619	48,052	61,959	120,762	134,669
1993	46,756	13,941	60,697	..	1,631	48,387	62,328	120,189	134,130
1994	44,278	13,916	58,194	111	1,517	45,906	59,822	118,095	132,011
1995	42,300	13,876	56,176	1,931	1,489	45,720	59,596	116,905	130,781
1996	41,953	13,860	55,813	1,937	1,482	45,372	59,232	116,875	130,735
1997	42,639	13,813	56,452	1,952	1,167	45,758	59,571	117,131	130,944
1998	61,193	..	61,193	2,095	1,377	64,665	64,665	135,488	135,488
1999	61,193	..	61,193	2,095	1,377	64,665	64,665	135,488	135,488
2000	55,539	..	55,539	2,366	1,618	59,523	59,523	131,363	131,363

.. Not applicable.
a. The MINESEB is the ministry responsible for primary and secondary school teachers; former VSNs *(volontaires du service national)* refers to former national service personnel who subsequently became teachers and who were paid through local governments until 1998, when their costs were transferred to MINESEB's budget vote. Until 1994 the MINESEB also oversaw vocational/technical education and training. With the creation of the METFP, some MINESEB staff were shifted to the new ministry.
Following a civil service census completed in 1999, employment records were adjusted to align them more closely with the actual deployment of staff. Specifically, 5,654 public employees were reallocated from the MINESEB's budget vote to those of the ministries to which they were actually assigned.
b. The METFP is the ministry responsible for vocational and technical education and training.
c. The MINESUP is the ministry responsible for higher education.
Source: MBDPA.

Table A3.4
Distribution of Government Employees by Education Sector Budget Vote, Madagascar, 1991–2000

Year	Share of government employees by budget vote (percent)				Total number of government employees, including former VSNs[d]
	MINESEB[a]	METFP[b]	MINESUP[c]	All three ministries	
1991	44.8	..	1.1	45.9	134,785
1992	44.8	..	1.2	46.0	134,669
1993	45.3	..	1.2	46.5	134,130
1994	44.1	0.1	1.1	45.3	132,011
1995	43.0	1.5	1.1	45.6	130,781
1996	42.7	1.5	1.1	45.3	130,735
1997	43.1	1.5	0.9	45.5	130,944
1998	45.2	1.5	1.0	47.7	135,488
1999	45.2	1.5	1.0	47.7	135,488
2000	42.3	1.8	1.2	45.3	131,363

.. Not applicable.
a. The MINESEB is the ministry responsible for primary and secondary education (and, before 1994, for vocational/technical education and training). Data include about 14,000 former VSNs who until 1998 were paid by local governments at the *fantany* (province) level.
b. The METFP, created in 1994, has responsibility for vocational/technical education and training.
c. The MINESUP is the ministry responsible for higher education.
d. Former VSNs refers to former *volontaires du service national* who were retained as public school teachers.
Source: Based on data supplied by the MBDPA; see Appendix table A3.2 for further details on sector breakdowns.

Table A3.5
GDP Per Capita and Per Worker, and Compensation of Government Employees in the Education Sector, Madagascar, 1992–98
(thousands of 1998 FMG)

Year	GDP per capita	GDP per worker	Annual take-home pay per worker					
			Teaching staff			Nonteaching staff		
			Primary and secondary	Vocational/ technical	Higher education	Primary and secondary	Vocational/ technical	Higher education
1991	1,519.2	—	4,290.7	—	9,643.2	2,364.0	—	1,710.1
1992	1,479.2	—	3,785.5	—	8,851.2	2,134.3	—	1,779.8
1993	1,468.9	3,587.5	3,825.6	—	8,233.4	1,908.4	—	1,587.6
1994	1,426.8	—	3,260.2	—	6,435.5	1,775.0	—	1,266.5
1995	1,389.9	—	3,072.3	—	5,438.9	1,832.4	—	1,271.8
1996	1,386.5	—	3,779.6	—	9,610.1	2,129.4	—	1,469.0
1997	1,396.6	2,766.6	3,687.9	4,756.0	8,096.4	2,103.4	3,194.0	1,092.8
1998	1,397.7	—	3,942.3	5,115.9	12,424.2	2,165.9	3,154.2	905.2

— Not available.
Source: INSTAT, Service de la Solde.

Table A3.6
Salaries of Teachers and of Other Wage Earners with Similar Qualifications, Madagascar, 1997
(thousands of current FMG)

Type of worker	Primary school teachers or workers with 9–11 years of schooling		Lower secondary school teachers or workers with 9–15 years of schooling	
	Male	Female	Male	Female
Public sector teachers	3,405.8	3,422.0	4,054.2	4,152.8
Wage earners of similar educational attainment				
Public sector	3,433.4	3,479.4	4,652.4	3,510.4
Private sector	3,832.9	3,233.4	4,590.8	3,008.7
Both sectors	3,633.2	3,356.4	4,621.6	3,259.6

Note: Salaries reflect take-home pay, including benefits.
Source: For teachers, based on data from the 1997–98 school census (which contains the salary grade for each teacher) combined with information on the civil service salary scale. For wage earners, based on data for household heads and their spouses in the 1997 *Enquête Permanente auprès de Ménages*, with the observations limited to those who (a) reported working more than 160 days in the previous year, (b) had a permanent contract, and (c) were employed in the civil service or by a private company. Some teachers may be included in the sample of wage earners.

Table A3.7
Distribution of Education Sector Staff by Function and Level of Education, Madagascar, 1998–99

Function	Primary	Secondary		Teacher training	Vocational/ technical	Higher education
		Lower	Upper			
Number of employees						
System management	5,208	1,857	777	23	427	152
Institutional administration and support	2,137	3,009	1,525	84	838	3,770
Classroom teaching	27,521	7,856	2,964	49	941	914
Other	0	0	0	0	0	311
Total	34,866	12,722	5,266	156	2,206	4,836
Percentage distribution						
System management	14.9	14.6	14.8	14.9	19.4	3.1
Institutional administration and support	6.1	23.7	29.9	53.7	38.0	78.0
Classroom teaching	78.9	61.7	56.3	31.3	42.7	18.9
Other	0.0	0.0	0.0	0.0	0.0	6.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Note: Assumes that staff in administrative positions in the MINESEB at the system level are allocated in proportion to the share of school-level personnel in primary and lower and upper secondary education.
Source: Based on Table 3.5.

Table A5.1
Distribution of Public and Private Sector Primary and Secondary Schools by Province, Madagascar, 1997–98
(percent, except as indicated)

Province	Primary schools			Lower secondary schools			Upper secondary schools		
	All	Public	Private	All	Public	Private	All	Public	Private
Antananarivo	34	25	62	46	30	65	55	27	68
Antsiranana	6	7	2	6	10	2	5	10	2
Fianarantsoa	27	28	21	19	25	12	12	17	9
Mahajanga	5	6	3	5	4	8	9	11	8
Toamasina	18	23	3	13	17	8	11	18	8
Toliara	10	10	9	10	14	6	9	18	4
All provinces	100	100	100	100	100	100	100	100	100
Number of schools[a]	12,082	9,152	2,930	1,091	587	504	249	84	165

a. Sections within a school offering different levels of education are counted as "schools" for the purpose of this table.
Source: Based on MINESEB 1997–98 school census.

Table A5.2
Percentage of Primary Schools Offering Full- and Part-Day Instruction, Madagascar, 1997–98

Province	Public schools			Private schools			All schools		
	Full day	Half day	*Temps partiel*	Full day	Half day	*Temps partiel*	Full day	Half day	*Temps partiel*
Antananarivo	90.6	6.2	3.0	84.7	13.6	1.7	85.7	12.4	1.9
Antsiranana	44.3	7.5	48.0	66.7	3.3	30.0	45.0	7.4	47.4
Fianarantsoa	40.3	17.4	41.3	47.5	14.0	38.4	41.8	16.7	40.7
Mahajanga	42.6	24.6	32.9	84.5	5.4	10.1	45.2	23.4	31.4
Toamasina	49.9	7.6	42.2	76.1	9.5	9.0	50.4	7.6	41.5
Toliara	17.7	59.9	22.3	91.2	6.7	2.1	34.1	48	17.8
All provinces	43.5	18.5	37.5	75.8	12.9	11.2	52.5	16.9	30.2

Note: Full-day instruction, at least 6 hours a day; half-day, 3 to 4 hours a day; *temps partiel*, 1 to 2 hours a day.
Source: Based on MINESEB 1997–98 school census.

Table A5.3
Regression Estimates of the Relation between Number of Teachers and Number of Pupils, with Provincial Dummy Variables, Primary and Secondary Schools, Madagascar, 1997–98

	Primary schools		Lower secondary schools		Upper secondary schools			
					Public sector		Private sector	
Item	Public sector	Private sector	Public sector	Private sector	(A)	(B)	(A)	(B)
Intercept	–0.105 (2.02)*	0.660 (8.19)**	3.566 (7.15)**	4.516 (16.59)**	8.356 (4.11)**	8.683 (6.17)**	9.275 (12.39)**	8.709 (12.66)**
Number of pupils	0.020 (59.75)**	0.023 (33.14)**	0.043 (24.87)**	0.022 (15.11)**	0.070 (13.36)**	0.069 (13.56)**	0.034 (6.24)**	0.034 (6.47)**
Fianarantsoa	0.369 (7.80)**	–0.218 (2.48)*	–1.161 (1.92)	–1.106 (2.15)*	–7.963 (2.65)**		–4.867 (3.06)**	
Toamasina	–0.495 (9.97)**	1.026 (2.60)**	–2.217 (3.73)**	–1.256 (1.65)	5.924 (1.50)		–3.346 (1.43)	
Mahajanga	0.120 (1.69)	0.113 (0.37)	–0.325 (0.42)	–1.031 (1.63)	–2.396 (0.93)		–2.882 (2.24)*	
Toliara	0.531 (9.56)**	0.121 (0.88)	0.917 (1.53)	0.095 (0.14)	4.321 (1.17)		2.921 (1.25)	
Antsiranana	–1.646 (19.39)**	0.427 (1.05)	–0.708 (0.87)	–0.673 (0.50)	–1.135 (0.47)		5.062 (0.86)	
R^2	0.75	0.66	0.87	0.47	0.89	0.87	0.31	0.26
Number of observations	9,158	2,932	608	504	91	91	184	184

* Statistically significant at the 5 percent level.
** Statistically significant at the 1 percent level.
Note: Numbers in parentheses are robust *t*-statistics. Antananarivo is the omitted province for the provincial dummy variables.
Source: Based on MINESEB 1997–98 school census.

Table A5.4
Regression Estimates of the Relation between Teacher Allocation and Number of Lower Secondary Students, Public Schools, Madagascar, 1997–98

	All Madagascar		Public secondary schools only						
			Antananarivo						
Item	Public sector	Private sector	City	Province	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
Intercept	2.90 (10.97)**	4.25 (17.15)**	24.17 (4.43)**	2.47 (3.50)**	5.33 (11.20)**	3.45 (9.77)**	3.62 (5.79)**	1.15 (2.88)**	4.15 (7.90)**
Number of pupils	0.043 (24.91)**	0.022 (15.48)**	0.035 (12.27)**	0.047 (14.60)**	0.032 (9.57)**	0.036 (12.04)**	0.041 (17.26)**	0.044 (16.70)**	0.045 (10.96)**
R^2	0.87	0.46	0.78	0.89	0.89	0.85	0.94	0.89	0.83
Number of observations	608	504	14	181	58	151	21	111	86

** Statistically significant at the 1 percent level.
Note: Numbers in parentheses are robust *t*-statistics.
Source: Based on MINESEB 1997–98 school census.

Table A5.5
Distribution of Public Primary Schools by Adequacy of Teaching Complement, Madagascar, 1997–98

Area/province and adequacy of staffing	Urban schools	Rural schools	All schools
Madagascar			
Adequately staffed	352	3,232	3,584
Overstaffed	522	1,709	2,231
Understaffed	345	2,998	3,343
All schools	1,219	7,939	9,158
Antananarivo (city)			
Adequately staffed	8	..	8
Overstaffed	67	..	67
Understaffed	11	..	11
All schools	86	..	86
Antananarivo (province)			
Adequately staffed	94	817	911
Overstaffed	164	518	682
Understaffed	68	670	738
All schools	326	2,005	2,331
Antsiranana			
Adequately staffed	8	148	156
Overstaffed	15	71	86
Understaffed	33	367	400
All schools	56	586	642
Fianarantsoa			
Adequately staffed	89	1,045	1,134
Overstaffed	157	618	775
Understaffed	53	647	700
All schools	299	2,310	2,609
Mahajanga			
Adequately staffed	14	202	216
Overstaffed	29	115	144
Understaffed	16	155	171
All schools	59	472	531
Toamasina			
Adequately staffed	82	671	753
Overstaffed	73	150	223
Understaffed	142	997	1,139
All schools	297	1,818	2,115
Toliara			
Adequately staffed	65	349	414
Overstaffed	84	237	321
Understaffed	33	162	195
All schools	182	748	930

.. Not applicable.
Note: Schools are evaluated in relation to staffing norms predicted from a regression equation based on data for the whole population of public and private schools in which the number of staff (the dependent variable) is expressed as a function of the number of students. A school is adequately staffed if the difference between actual number of staff and that predicted for a school of the same size, rounded off to the nearest whole number, is zero; it is overstaffed if the difference exceeds zero, and it is understaffed if the difference falls below zero.
Source: Estimated from MINESEB 1997–98 school census.

Table A5.6
Distribution of Public Secondary Schools by Adequacy of Teaching Complement, Madagascar, 1997–98

Area/province and adequacy of staffing	Lower secondary schools			Upper secondary schools
	Urban	Rural	All	
Madagascar				
Adequately staffed	8	88	96	3
Overstaffed	80	228	308	53
Understaffed	35	169	204	35
All schools	123	485	608	91
Antananarivo (city)				
Adequately staffed	0	..	0	..
Overstaffed	13	..	13	..
Understaffed	1	..	1	..
All schools	14	..	14	..
Antananarivo (province)				
Adequately staffed	0	23	23	0
Overstaffed	24	59	83	15
Understaffed	11	64	75	9
All schools	35	146	181	24
Antsiranana				
Adequately staffed	1	4	5	1
Overstaffed	3	41	44	5
Understaffed	5	4	9	2
All schools	9	49	58	8
Fianarantsoa				
Adequately staffed	3	29	32	0
Overstaffed	14	55	69	5
Understaffed	6	44	50	12
All schools	23	128	151	17
Mahajanga				
Adequately staffed	1	4	5	1
Overstaffed	6	6	12	5
Understaffed	3	1	4	4
All schools	10	11	21	10
Toamasina				
Adequately staffed	1	19	20	1
Overstaffed	13	27	40	12
Understaffed	7	44	51	4
All schools	21	90	111	17
Toliara				
Adequately staffed	2	9	11	0
Overstaffed	20	40	60	11
Understaffed	3	12	15	4
All schools	25	61	86	15

**Not applicable.
Note: Schools are evaluated in relation to staffing norms predicted from a regression equation based on data for the whole population of public and private schools in which the number of staff (the dependent variable) is expressed as a function of the number of students. A school is adequately staffed if the difference between actual number of staff and that predicted for a school of the same size, rounded off to the nearest whole number, is zero; it is overstaffed if the difference exceeds zero, and it is understaffed if the difference falls below zero.
Source: Based on MINESEB 1997–98 school census.

Table A5.7
Correlates of the Allocation of Teachers Recruited for Public Primary Schools, Madagascar, 1997–2000

Item	Model 1		Model 2	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Intercept	–2.508	–40.05	–2.508	–39.13
Number of pupils	0.001	6.37	0.001	5.43
School with a shortfall of teachers	0.468	5.73		
School with a surplus of teachers	–0.026	–0.29		
School with a shortfall of:[a]				
1 teacher			0.317	3.43
2 teachers			0.583	4.60
More than 2 teachers			0.8619	5.59
School with a surplus of:[a]				
1 teacher			0.070	0.69
2 teachers			–0.372	–1.90
3 teachers			–0.048	–0.20
More than 3 teachers			–0.760	–2.42
Pseudo R^2	0.016		0.022	—
Number of observations		9,209		
Number of schools with at least one new teacher:		957		

a. The omitted category is schools that are adequately staffed. Adequacy of staffing is evaluated in relation to staffing norms predicted from a regression equation based on data for the whole population of public and private schools in which the number of staff (the dependent variable), is expressed as a function of the number of students. A school is adequately staffed if the difference between actual number of staff and that predicted for a school of the same size, rounded off to the nearest whole number, is zero; it is overstaffed if the difference exceeds zero, and it is understaffed if the difference falls below zero.
Source: Based on data supplied by the MINESEB on the recruitment exercises of 1997–98 and 1999–2000, merged to schools in the 1997–98 school census.

Table A5.8
Cost Functions by Type of Public Primary and Secondary School, Madagascar, 1997–98

Item	Primary			Lower secondary			Upper secondary
	All schools	Urban schools	Rural schools	All schools	Urban schools	Rural schools	
Intercept	5.38 (124.74)**	4.42 (48.08)**	5.93 (138.95)**	7.72 (71.29)**	7.53 (16.08)**	8.26 (64.16)**	9.20 (34.97)**
Pupils enrolled	0.79 (84.31)**	1.04 (61.05)**	0.66 (70.43)**	0.67 (30.62)**	0.74 (9.83)**	0.54 (18.85)**	0.57 (11.18)*
Returns to scale[a]	1.26	0.96	1.51	1.49	1.36	1.87	1.76
R^2	0.54	0.75	0.44	0.69	0.69	0.50	0.78
Number of observations	8,862	1,203	7,659	586	120	466	88

* Statistically significant at the 5 percent level.
** Statistically significant at the 1 percent level.
Note: The model is a double log specification relating total spending on personnel to number of pupils. Numbers in parentheses are robust *t*-statistics.
a. Refers to the inverse of the percentage increase in total spending in relation to the percentage increase in enrollments.
Source: Authors' estimates based on MINESEB 1997–98 school census.

Table A5.9
Fourth-Graders' Scores on Monitoring Learning Achievement (MLA) Tests, 1999
(percentage correct)

Country	Sample size	Life skills	Literacy	Numeracy	Average score
Botswana	5,529	56.0	48.0	51.0	51.7
Madagascar	3,165	72.1	54.7	43.7	56.8
Malawi	3,283	77.0	35.0	43.0	51.7
Mali	1,365	56.9	51.8	43.6	50.8
Mauritius	4,138	58.0	61.0	58.5	59.2
Morocco	1,800	62.3	67.6	56.4	62.1
Niger	1,532	47.7	41.1	37.3	42.0
Senegal	2,223	46.7	48.9	39.7	45.1
Tunisia	3,649	74.7	77.9	60.4	71.0
Uganda	8,346	66.8	58.0	49.3	58.0
Zambia	1,761	51.0	43.0	36.0	43.3
Average		60.8	53.4	47.2	53.8

Source: UNESCO (1999b).

Table A5.10
Second- and Fifth-Graders' Year-End Test Scores in Mathematics and French in the PASEC Survey, 1995–98
(percentage correct)

Country	Survey year	Grade 2, French		Grade 2, mathematics		Grade 5, French		Grade 5, mathematics	
		Score	s.d.	Score	s.d.	Score	s.d.	Score	s.d.
Burkina Faso	1995	55.8	24.6	52.2	24.0	43.6	15.6	46.3	15.6
Cameroon	1995	66.5	22.6	59.5	22.0	55.8	17.7	50.6	16.8
Côte d'Ivoire	1995	57.6	24.3	44.4	19.3	50.1	15.8	40.5	14.2
Madagascar[a]	1998	57.9	21.8	66.3	21.6	42.3	15.6	58.8	16.8
Senegal	1995	42.7	24.8	45.1	23.0	34.5	16.3	37.2	16.3
Sample average		56.1		53.5		45.3		46.6	

s.d. Standard deviation.
a. The grade 5 test for mathematics was administered to 20 pupils in French, and to 5 pupils in Malagasy. To facilitate cross-country comparisons, the scores here correspond to those obtained by pupils taking the test in French. Note that the performance of the two groups is comparable.
Source: Tabulations based on PASEC surveys.

Table A5.11
Sample Characteristics of Pupils and Schools in the 1997–98 PASEC Survey, Madagascar

Grade and indicator	Total		Private schools		Public schools	
	Mean	s.d.	Mean	s.d.	Mean	s.d.
Grade 2						
Outgoing test score (units of s.d. of percentage correct)	0.0	1.00	0.31	0.98	–0.09	0.99
Incoming test score (units of s.d. of percentage correct)	0.0	1.00	0.33	1.04	–0.10	0.97
Girl	0.51	0.50	0.51	0.50	0.50	0.50
Age (years)	8.44	1.46	7.65	1.39	8.68	1.39
Repeater	0.54	0.50	0.38	0.49	0.58	0.49
Speaks only Malagasy at home	0.71	0.45	0.69	0.46	0.72	0.45
Receives parental help with homework	0.72	0.47	0.69	0.45	0.73	0.48
Has math or reading textbook	0.66	0.45	0.71	0.45	0.64	0.46
Public spending per pupil (1,000 FMG)					134.87	64.96
Class size	49.02	24.49	47.80	15.54	49.36	26.45
Teacher experience (years)	14.31	8.95	6.48	0.26	16.49	7.93
Initial training of teacher (years)	10.15	1.92	10.88	2.80	9.94	1.55

(Continued)

Table A5.11 *(continued)*

Grade and indicator	Total		Private schools		Public schools	
	Mean	s.d.	Mean	s.d.	Mean	s.d.
Preservice training of teacher (months)	4.38	5.90	5.68	7.20	4.02	5.48
Index of classroom conditions[a]	100.22	9.46	101.74	8.64	99.79	9.68
Private sector	0.22	0.41	1.00	0.00	0.00	0.00
Number of pupils	1,993		461		1,532	
Number of classrooms	115		25		90	
Grade 5						
Outgoing test score (units of s.d. of percentage correct)	0.00	1.00	0.54	1.02	–0.17	0.93
Incoming test score (units of s.d. of percentage correct)	0.00	1.00	0.54	0.85	–0.17	0.98
Girl	0.55	0.50	0.55	0.50	0.55	0.50
Age (years)	12.08	1.54	11.24	1.51	12.34	1.45
Repeater	0.66	0.47	0.49	0.50	0.71	0.45
Speaks only Malagasy at home	0.73	0.44	0.70	0.46	0.74	0.44
Receives parental help with homework	0.53	0.50	0.62	0.49	0.50	0.50
Has math or reading textbook	0.81	0.24	0.84	0.19	0.80	0.25
Public spending per pupil (1,000 FMG)					174.54	66.73
Class size	36.85	13.94	46.17	15.40	34.19	12.35
Teacher experience (years)	15.58	9.26	11.17	8.90	16.84	9.02
Initial training of teacher (years)	10.76	5.37	13.71	10.64	9.92	1.60
Preservice training of teacher (months)	4.09	5.10	5.15	6.29	3.79	4.70
Index of classroom conditions[a]	100.45	9.12	99.80	9.68	100.64	9.01
Private sector	0.22	0.78	1.00	0.00	0.00	0.00
Number of pupils	1,900		448		1,452	
Number of classrooms	108		24		84	

s.d. Standard deviation.
a. The index is constructed using principal components analysis based on the following physical classroom conditions: the structure is permanent, it has electricity, and it is equipped with a cupboard, with chairs and tables for all pupils, and with rulers, set squares, compasses, a dictionary, and maps of Madagascar, Africa, and the world. The index ranges from about 116 for classrooms with all these features to 83 for those with none of them.
Source: Based on PASEC surveys.

Table A5.12
Probit Estimates of a Child's Probability of Attending a Private School, Madagascar, 1997–98

Indicator	Grade 2		Grade 5	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Intercept	–2.980	6.63	–0.431	0.80
Girl	0.050	0.73	–0.034	0.49
Age (years)	–0.248	9.85	–0.234	10.04
Lives with parents	0.140	1.44	–0.124	1.24
Index of family wealth[a]	0.036	9.86	0.021	5.20
Private sector share of schools in child's home district (percent)[b]	0.014	10.30	0.015	10.72
Pseudo R^2	0.199		0.169	
Log likelihood ratio (chi^2 distribution)	429.42		349.72	
Number of observations	1,993		1,900	

a. The wealth index is constructed using principal components analysis based on a family's ownership of the following assets: armchair, refrigerator, tap, electricity, car, bike, moped, video player, TV, radio, gas stove, in-house toilet. The index ranges from about 133 for a family that owns all the items to about 90 for a family that owns none of them.
b. District refers to *firaisana*.
Source: Based on data from 1999 PASEC survey for Madagascar.

Table A5.13
Correlates of Fifth Graders' Combined Scores in Mathematics and French, Madagascar, 1997–98

	Excluding school inputs as regressors		Including school inputs as regressors	
Indicator	OLS	Controlling for selectivity	OLS	Controlling for selectivity
Intercept	1.234 (6.90)**	1.150 (6.33)**	0.619 (2.08)*	0.510 (1.65)
Incoming test score	0.403 (15.49)**	0.396 (15.09)**	0.400 (15.21)**	0.395 (14.88)**
Girl	0.064 (1.58)	0.070 (1.75)	0.063 (1.59)	0.069 (1.72)
Age	–0.069 (4.59)**	–0.042 (2.23)*	–0.064 (4.34)**	–0.042 (2.21)*
Repeater	–0.094 (2.13)*	–0.087 (1.98)*	–0.083 (1.88)	–0.077 (1.74)
Speaks only Malagasy at home	–0.212 (3.35)**	–0.203 (3.25)**	–0.189 (2.99)**	–0.184 (2.93)**
Receives parental help with homework	0.037 (0.93)	0.035 (0.88)	0.045 (1.12)	0.044 (1.10)
Has math or reading textbook			0.113 (2.15)*	0.111 (2.10)*
Class size			–0.008 (4.47)**	–0.007 (4.28)**
Teacher's years of experience			0.007 (2.55)*	0.007 (2.42)*
Teacher's years of formal education			–0.003 (0.77)	–0.005 (1.02)
Teacher's months of preservice training			0.003 (0.96)	0.003 (1.16)
Index of physical facilities of classroom[a]			0.007 (3.29)**	0.007 (3.41)**
Private school	0.311 (5.93)**	0.645 (4.40)**	0.454 (7.08)**	0.729 (4.94)**
λ		0.211 (2.44)*		0.178 (2.06)*
R^2	0.27	0.27	0.29	0.29
Number of observations	1,900	1,900	1,900	1,900

* Statistically significant at the 5 percent level.
** Statistically significant at the 1 percent level.
Note: Numbers in parentheses are robust *t*-statistics. OLS, ordinary least squares. The letter l denotes the correction term for sample bias.
a. The index is constructed using principal components analysis based on the following physical classroom conditions: the structure is permanent, it has electricity, and it is equipped with a cupboard, with chairs and tables for all pupils, and with rulers, set squares, compasses, a dictionary, and maps of Madagascar, Africa, and the world. The index ranges from about 116 for classrooms with all these features to 83 for those with none of them.
Source: Based on data from 1997–98 PASEC survey for Madagascar.

Table A5.14
Correlates of Second- and Fifth-Graders' Combined Scores in Mathematics and French, Public Schools, Madagascar, 1997–98

	Grade 2		Grade 5	
Indicator	Model 1	Model 2	Model 1	Model 2
Intercept	–1.209 (3.35)**	–1.976 (4.86)**	0.517 (1.17)	0.187 (0.41)
Incoming test score	0.553 (22.75)**	0.561 (22.65)**	0.335 (11.15)**	0.344 (11.36)**
Girl	0.086 (1.78)	0.084 (1.74)	0.128 (2.56)*	0.126 (2.54)*
Age	0.046 (2.16)*	0.050 (2.32)*	–0.106 (4.50)**	–0.088 (3.64)**
Repeater	–0.091 (1.79)	–0.082 (1.63)	–0.037 (0.66)	–0.036 (0.65)
Speaks only Malagasy at home	–0.067 (0.75)	–0.065 (0.73)	–0.161 (1.82)	–0.159 (1.80)
Receives parental help with homework	0.019 (0.33)	0.026 (0.45)	0.062 (1.25)	0.050 (1.02)
Has math or reading textbook	0.108 (1.91)	0.126 (2.20)*	0.271 (4.41)**	0.245 (3.94)**
Public spending per pupil (1,000 FMG)[a]	0.001 (2.42)*		0.001 (3.11)**	
Class size		–0.000		–0.005
	(0.757)		(2.72)**	
Teacher's years of experience		0.006		–0.003
	(1.71)		(0.75)	
Teacher's years of formal education		0.071		0.070
	(4.45)**		(4.80)**	
Teacher's months of preservice training		–0.016		0.014
	(3.38)**		(2.12)*	
Index of classroom's physical features[b]	0.004 (1.63)	0.005 (1.85)	0.004 (1.63)	0.000 (0.21)
λ	0.285 (2.19)*	0.394 (3.15)**	–0.547 (3.57)**	–0.350 (2.35)**
R^2	0.34	0.35	0.21	0.22
Number of observations	1,164	1,164	1,205	1,205

* Statistically significant at the 5 percent level.
** Statistically significant at the 1 percent level.
Note: Numbers in parentheses are *t*-statistics.
a. Public spending per pupil is computed by averaging the specific classroom teacher's salary plus benefits over the number of pupils in the class and adding the total cost of other personnel at the school divided by the number of pupils in the school.
b. The index is constructed using principal components analysis based on the following physical classroom features: the structure is permanent, it has electricity, and it is equipped with a cupboard, with chairs and tables for all pupils, and with rulers, set squares, compasses, a dictionary, and maps of Madagascar, Africa, and the world. The index ranges from about 116 for classrooms with all these features to 83 for those with none of them.
Source: Based on data from the 1997–98 PASEC survey for Madagascar.

Table A5.15
Logit Regression Estimates of the Relation between Pass Rates on National Examinations and Public Spending Per Student, Madagascar, 1997–98

	CEPE			BEPC			*Baccalauréat*		
Indicator	Coefficient	*t*-statistic	Marginal effect	Coefficient	*t*-statistic	Marginal effect	Coefficient	*t*-statistic	Marginal effect
Intercept	–1.5175	–10.17		–2.0655	–4.14		–1.7207	–2.01	
Index of school conditions	0.0037	2.80	0.00076	0.0124	2.71	0.00262	0.0098	1.30	0.00222
Unit cost (1,000 FMG)	0.0021	8.07	0.00043	0.0007	3.46	0.00014	0.0001	0.67	0.00002
Rural area[a]	–0.1693	–5.71	–0.03608	–0.2999	–4.10	–0.06507			
Province[b]									
Fianarantsoa	0.7065	19.38	0.15756	–0.2818	–3.53	–0.05754	–0.2620	–1.52	–0.05778
Toamasina	0.9103	25.29	0.20430	–0.1708	–1.99	–0.03520	0.1474	0.75	0.03400
Mahajanga	0.8045	15.14	0.18667	–0.5093	–3.37	–0.09645	–0.3418	–1.59	–0.07466
Toliara	0.3703	7.45	0.08178	–0.2074	–1.92	–0.04236	0.0700	0.40	0.01602
Antsiranana	0.5749	12.09	0.13012	–0.3292	–3.03	–0.06549	0.2874		
Adjusted R^2	0.1667			0.1286			84		
Number of schools	4,650			505					

Note: CEPE, *certificat d'études primaires élémentaires*; BEPC, *brevet d'enseignement du premier cycle*.
a. Relative to urban areas.
b. Relative to Antananarivo Province.
Source: Based on MINESEB 1997–98 school census.

Table A6.1
Organization of Vocational and Technical Education, Madagascar

Program	Point of entry	Duration (years)	Diploma
Centres de formation professionnelle (CFPs)			
• Current structure			
Level I	At end of grade 7.	2	*Certificat d'études de formation professionnelle de niveau I* (CFE/FP-I)
Level II	At end of grade 8.	2	*Certificat d'études de formation professionnelle de niveau II* (CFE/FP-II)
• Provisions in Decree 97-1356			
Formation d'ouvrier spécialisé	At end of grade 5.	2	*Certificat de fin d'apprentissage* (CFA)
Formation d'ouvrier qualifié	At end of grade 6; CFA holders may enter directly in second year depending on their qualifications.	3	*Certificat d'aptitude professionnelle* (CAP)
Lycées techniques et professionnels (LTPs)			
• Current structure	By competitive exam for *brevet d'enseignement du premier cycle* (BEPC) holders.	3	At end of second year (optional diplomas): *brevet technique* (BT); *brevet d'agent d'exécution* (BAE) At end of third year : *baccalauréat technique*
• Provisions in Decree 97-1356			
Formation d'employé qualifié	At end of grade 9; CAP holders may enter directly in second year depending on their qualifications.	3	*Brevet d'études professionnelles* (BEP)
Formation de technicien ou agent de maîtrise	Same qualifications as for BEP holders.	1	*Baccalauréat professionnel* (Bac Pro)
Formation de technicien supérieur	*Baccalauréat professionnel; baccalauréat technologique*	2	*Brevet de technicien supérieur* (BTS)
Formation technologique	By competitive exam for BEPC and CAP holders.	3	*Baccalauréat technologique*

Note: Decree 97-1356 seeks to broaden the type and level of vocational/technical education offered, in part through the development of training in basic vocational skills.
Source: METFP

Table A6.2
Number of Institutions and Number of Students by Field of Study, Public Sector Vocational and Technical Education, Madagascar, 1998–99

	CFP			LTP		
Field of study[a]	Number of institutions	Number of students enrolled	Average number of students per institution and field of study	Number of institutions	Number of students enrolled	Average number of students per institution and field of study
Tertiary sector						
Technique commerciale				1	209	209
FTG tertiaire				3	59	20
Technique de gestion	1	59	59	13	1,902	146
Hôtellerie	1	88	88			
Technique de secrétariat				6	358	60
Civil engineering						
Ouvrage bois	21	376	18	20	802	40
Bâtiment et travaux publics	14	243	17	21	1,809	86
FTG génie civil				3	54	18
Ouvrage métallique	11	200	18	17	781	46
Industrial engineering						
Art décoratif–sculpture	1	6	6			
Coupe–couture–broderie	8	356	45			
Céramique	1	3	3			
Couture floue	1	29	29			
Charpenterie de marine	2	40	20			
Confection	1	19	19			
Electrotechnique				6	654	109
Ebénisterie—marqueterie	1	27	27			
Electronique				1	203	203
Fabrication mécanique				6	566	94
Froid	1	22	22			
FTG industriel				4	89	22
Habillement	4	138	35			

(Continued)

Table A6.2 *(continued)*

Field of study[a]	CFP			LTP		
	Number of institutions	Number of students enrolled	Average number of students per institution and field of study	Number of institutions	Number of students enrolled	Average number of students per institution and field of study
Imprimerie	1	26	26			
Installation sanitaire, climatique et thermique	1	13	13			
Mécanique automobile				9	682	73
Métaux en feuille				2	125	63
Mécanique générale				1	63	63
Tailleur	1	16	16			
Agricultural sector						
Agricole				1	7	7
Agriculture—élevage				1	65	65
Mécanique d'engins et matériels agricoles				1	49	49

Note: Blanks indicate zero.
a. Fields of study are shown according to their French names to retain exact correspondence with the programs actually offered in the system.
Source: Authors' estimates based on data from METFP.

Table A7.1
Number of Students by Field in University Faculties, *Ecoles Supérieures*, University *Instituts*, and ISTs, Madagascar, 1998–99

Institution and program	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara	Number of institutions	Number of students	Students per institution: Average number	Minimum number	Maximum number
University faculties											
DEGS											
Law	1,153		1,149				2	2,302	1,151	1,149	1,153
Economics	785				441		2	1,226	613	441	785
Management	2,464				690		2	3,154	1,577	690	2,464
Sociology	339						1	339	339	339	339
ISPG					52		1	52	52	52	52
Sciences											
Mathematics	454		63				2	517	259	63	454
MISA	32						1	32	32	32	32
Physics and chemistry	708	174	164			85	4	1,131	283	85	708
Natural sciences	1,310			270		132	3	1,712	571	132	1,310
TSST	50						1	50	50	50	50
MISS and ISTE			107				1	107	107	107	107
UFP				49			1	49	49	49	49
Arts											
Foreign languages	90						1	90	90	90	90
Malagasy	647					164	2	811	405	164	647
History	334				125	66	3	525	175	66	334
Geography	646				159	315	3	1,120	373	159	646
Philosophy	70				112	79	3	261	87	70	112
DIFP	35						1	35	35	35	35
French	428	226			127	109	4	890	223	109	428
Spanish											
English	358						1	358	358	358	358
Civilization	2						1	2	2	2	2
German	126						1	126	126	126	126
Medicine	1,668			852			2	2,520	1,260	852	1,668

(Continued)

Table A7.1 *(continued)*

Institution and program	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara	Number of institutions	Number of students	Students per institution: Average number	Minimum number	Maximum number
Ecoles* and *instituts											
ESSA											
Tronc commun (core curriculum)	282						1	282	282	282	282
Agriculture	41						1	41	41	41	41
Agromanagement	38						1	38		38	38
Livestock	39						1	39		39	39
Industries agricoles et alimentaires	38						1	38		38	38
Water management and forestry	39						1	39		39	39
ESP											
Tronc commun	401	89					2	490	245	89	401
Electronics	29	43					2	72	36	29	43
BTP	119						1	119	119	119	119
Hydraulics	59						1	59	59	59	59
Hydraulique-energétique		7					1	7	7	7	7
Mining	41						1	41	41	41	41
Geology	25						1	25	25	25	25
Géom-topographe	41						1	41	41	41	41
Télécom-électronique	36						1	36	36	36	36
Génie chimique	63						1	63	63	63	63
Génie électrique		69					1	69	69	69	69
Génie mécanique		63					1	63	63	63	63
Meteorology	6						1	6	6	6	6
Génie industriel	85						1	85	85	85	85
Telecommunications	58						1	58	58	58	58
ENS											
Tronc commun			67				1	67	67	67	67
English	79						1	79	79	79	79

(Continued)

Table A7.1 *(continued)*

Institution and program	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara	Number of institutions	Number of students	Students per institution: Average number	Minimum number	Maximum number
French	85						1	85	85	85	85
Malagasy	69						1	69	69	69	69
History and geography	71						1	71	71	71	71
Mathematics			32				1	32	32	32	32
Philosophy						46	1	46	46	46	46
Physics and chemistry	54		55				2	109	54,5	54	55
Natural sciences	68						1	68	68	68	68
EPS	115						1	115	115	115	115
ENSET											
Tronc commun		34					1	34	34	34	34
Mathematics		29					1	29	29	29	29
Génie électrique		43					1	43	43	43	43
Génie mécanique		34					1	34	34	34	34
ENI			96				1	96	96	96	96
IHSM											
Formation académique						54	1	54	54	54	54
Formation professionnalisante						30	1	30	30	30	30
IOSTM				142			1	142	142	142	142
Instituts supérieurs de technologie (IST)											
Industrial engineering											
Industrial maintenance	46						1	46	46	46	46
Maintenance of electrical-mechanical equipment		45					1	45	45	45	45
Maintenance of cooling and heating equipment		44					1	44	44	44	44
Civil engineering											
Building	51						1	51	51	51	51

(Continued)

Table A7.1 *(continued)*

Institution and program	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara	Number of institutions	Number of students	Students per institution: Average number	Minimum number	Maximum number
Public works	50						1	50	50	50	50
Services											
Commerce	44						1	44	44	44	44
Accounting	48						1	48	48	48	48
GPME	45						1	45	45	45	45

Note: Blanks indicate zero. BTP, *batiment et travaux publics*; DEGS, law, economics, management, and sociology; DIFP, Département Interdisciplinaires et de Formation Professionnelle; ENI, Ecole Nationale d'Informatique; ENS, *école normale supérieure*; ENSET, Ecole Normale Supérieure pour l'Enseignement Technique; EPS, *éducation physique et sportive*; ESP, *école supérieure polytechnique*; ESSA, Ecole Supérieure des Sciences Agronomiques; GPME, *gestion des petites et moyens entreprises*; IHSM, Institut Halieutique des Sciences Marines; IOSTM, Institut d'Odontologie-Stomatologie Tropicale de Madagascar; ISPG, Institut Supérieur Professionnel de Gestion; ISTE, Institut des Sciences et Techniques de l'Environnement; MISA, Maîtrise d'Informatique et de Statistiques Appliquées; MISS, Mathématiques et Informatique pour les Sciences Sociales; TSST, Technicien Supérieur en Sciences de la Terre; UFP, Unité de Formation Professionnalisante.
Source: Authors' estimates based on MINESUP data.

Table A8.1
Employment in the Formal Industrial Sector, Madagascar, 1994 and 1996

Indicator	1994	1996
Number of firms		
Sole proprietorship	5,318	6,139
Companies	507	608
Export-processing zone enterprises	66	110
Total	5,891	6,857
Number of workers		
Sole proprietorship	38,800	39,200
Companies	84,100	87,900
Export-processing zone enterprises	17,400	36,700
Total	140,300	163,800
Average number of workers per enterprise	24	22
Sole proprietorship	7.3	6
Companies	169	172
Share of industrial sector in GNP (percent)	11.6	9.3

Source: MADIO (1998).

Table A8.2
Earning Functions, Madagascar, 1999

Indicator	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Constant	12.4350	60.91	12.4622	60.11
Years of schooling	0.0689	9.76		
Level of education attained[a]				
Primary			0.1919	2.03
Lower secondary			0.4330	4.27
Upper secondary			0.6503	6.29
Higher education			1.0828	8.59
Age	0.0442	4.42	0.0469	4.63
Age squared	–0.0003	3.13	–0.0004	3.41
Female/male	–0.2135	4.15	–0.2114	4.11
Informal sector/formal sector	–0.4747	6.88	–0.4911	7.13
Economic sector[b]				
Industry	0.6280	7.14	0.6633	7.64
Energy	1.1769	4.85	1.2286	4.85
Construction and public works	0.8759	7.52	0.9119	8.07
Commerce	0.5158	4.18	0.5423	4.39
Transport and communication	0.6794	5.98	0.7307	6.48
Hotel and restaurant	0.6691	4.59	0.6860	4.86
Health and education (private sector)	0.4718	3.49	0.5060	3.86
Security services (private sector)	0.3183	1.21	0.3656	1.42
Banking and insurance	1.2608	6.64	1.2441	6.38
Civil service	0.8106	8.41	0.8625	9.18
Post, telephone, and telegraph (private sector)	0.7825	3.94	0.8859	4.37
Other	0.4157	4.28	0.4348	4.53
Province[c]				
Fianarantsoa	–0.0289	0.34	–0.0469	0.55
Toamasina	–0.1643	2.23	–0.1803	2.45
Mahajanga	0.0708	0.97	0.0506	0.70
Toliara	0.1166	1.68	0.0957	1.32
Antsiranana	0.1635	1.49	0.1106	1.46
R^2	0.6169		0.4397	
Number of observations	2,031		2,031	

Note: Data are for wage earners only. The dependent variable is the annual salary (excluding benefits) from the main job. The results reflect estimates based on a semilogarithmic model specification corrected for heteroscadasticity but not for selection bias.
a. Relative to those with no schooling.
b. Relative to wage earners in a primary sector job.
c. Relative to Antananarivo.
Source: Authors' estimates based on 1999 *Enquête Prioritaire auprès des Ménages*.

Table A8.3
Probability of Participation in Skills Upgrading, Madagascar, 1999

Indicator	Coefficient	*t*-statistic
Constant	–6.5839	–5.33
Age	0.1233	2.25
Age squared	–0.0013	–1.89
Formal sector wage earner	0.4873	–1.75
Level of initial education[a]		
Primary	0.1981	0.25
Secondary	1.9182	2.63
Higher education	2.2116	2.94
Pseudo R^2	0.088	
Number of observations	2,031	

Note: Data are for wage earners only. The dependent variable takes the value of 1 if the person has participated in in-service training and zero otherwise. The results reflect maximum likelihood estimates of a logistic model specification.
a. Relative to a wage earner with no schooling.
Source: Authors' estimates based on 1999 *Enquête Prioritaire auprès des Ménages*.

Table A8.4
Earnings Function, including Participation in Skills Upgrading, Formal Sector, Madagascar

Indicator	Coefficient	*t*-statistic
Constant	13.2457	94.40
Years of schooling	0.0746	11.86
Age	0.0521	1.80
Age squared	0.0001	3.35
Female/male	–0.0716	1.50
Has had skills-upgrading training	0.1137	1.89
Economic sector[a]		
Industry	0.2453	2.71
Energy	0.8605	4.41
Construction and public works	0.6675	4.77
Commerce	0.2431	2.09
Transport and communication	0.3189	2.76
Hotel and restaurant	0.2742	1.59
Health and education (private sector)	0.0672	0.52
Security services (private sector)	0.0589	0.30
Banking and insurance	0.8099	3.81
Civil service	0.4457	4.73
Post, telephone, and telegraph (private sector)	0.4642	2.06
Other	–0.0603	0.54
Province[b]		
Fianarantsoa	–0.0765	0.99
Toamasina	0.0111	0.16
Mahajanga	0.0476	0.69
Toliara	0.1209	1.52
Antsiranana	0.1086	1.18
R^2	0.2367	
Number of observations	1,477	

Note: Data are for wage earners only. The dependent variable is annual salary (excluding benefits) from the main job. The results reflect estimates of a semilogarithmic specification corrected for heteroscadasticity but not for possible selection bias.
a. Relative to wage earners in a primary sector job.
b. Relative to Antananarivo.
Source: Authors' estimates based on 1999 *Enquête Prioritaire auprès des Ménages.*

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All weather roads
Routes accessibles en toute saison
Non-permanent roads
Routes saisonnières
Railroads
Chemin de fer
Rivers
Fleuves et rivières
Airports
Aéroports
National capital
Capitale d'Etat
Faritany (province) capitals
Chef-lieu de Faritany
Faritany boundaries
Limites des Faritany
International boundaries
Limites des Etats
Antsiranana
ANTSIRANANA
Antalaha
Mahajanga
MAHAJANGA
TOAMASINA
Toamasina
ANTANANARIVO
Antananarivo
Antsirabe
Ambositra
Mananjary
TOLIARY
Toliary
FIANARANTSOA
Fianarantsoa
Farafangana
Tolagnaro
Morombe
Maintirano
Besalampy
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Marovoay
Ambatoboeny
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Port Bergé
Mandritsara
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Sambava
Andapa
Vohemar
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Nosy Be
Hell-ville
Ambanja
Analalava
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Befandriana
Mananara
Soanierana Ivongo
Nosy Boraha
Ambodifotatra
Andilamena
Andriamena
Fenoarivo Atsinanana
Ambatondrazaka
Morafenobe
Antsalova
Miandrivazo
Belo Tsiribihina
Malaimbandy
Morondava
Mahabo
Ambatofinandrahana
Ambohimahasoa
Ifanadiana
Nosy Varika
Manja
Maramanga
Vohibinany
Vatomandry
Anosibe an'Ala
Mahanoro
Marolambo
Farafangana
Vangaindrano
Ihosy
Ivohibe
Ambalavao
Ikongo
Manakara
Vohipeno
Betroka
Midongy Atsimo
Sakaraha
Betioky-Sud
Ampanihy
Amboasary Sud
Amboronbe
Benenitra
Manantenina
Bekily
Beraketa
Ankazoabo
Tsiroanomandidy
Soavinandriana
Arivonimamo
Ambatolampy
Fanjakana
Sahanivotry
Tsiribihina
Mangoro
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Fanandava
Beroroha
Ihosy
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Sambirano
Andranomena
Ankazoabo
Anjozorobe
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